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ATTENTION

A HISTORICAL SUMMARY OF THE DISCUSSIONS CONCERNING THE SUBJECT

A DISSERTATION

PRESENTED

TO THE JOHNS HOPKINS UNIVERSITY ON APPLICATION FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY, 1889

BY

REV. LEMON L. UHL, PH. D.

BALTIMORE
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INTRODUCTION.

The history of an idea leads one through long paths and into strange by-ways, introducing one into regions unexpected while often passing entirely by more familiar territory. Such, at least, has been our experience in attempting to trace out the various theories on attention through the ages since human conceptions have been recorded. A history of this kind, necessarily including the conclusions of many men of different times and combining these thoughts in various shadings and contrasts, rises far above the biography of one individual's life in interest and importance. Along with this larger compass of view go greater difficulties in the collection, selection and classification of materials, as all who have done similar work are aware. In surveying the views of mankind on the particular subject of attention, these difficulties are unusually great :—there is no history of the ideas on the subject and no list of the literature of the topic so far as we can find, the only partial references being a few pages of quotations in Volkmann's Lehrbuch der Psychologie, and some brief statements in a chapter of Sir Wm. Hamilton's Metaphysics; then also the literature lies scattered in many languages both of the past and the present, requiring much time to search it out; and, finally, what is given by most writers lies imbedded in a mass of statements and views on other subjects and without index or reference.

The difficulties referred to above have not been mentioned so much to show any possible magnitude in the work of this dissertation, as to point out that the subject of attention has been neglected in philosophy and in psychology, and that it is relatively a new theme. The facts of attention attracted ancient writers and the word was used, but there was scarcely any discussion about it; such subjects as sensation, imagination, memory, knowledge and soul were of so much greater importance as to command the thought and study of the early day and the middle ages; at a later time it was not thought important enough to be included in the table of contents even when discussed in the body of a work; and when, at a comparatively recent date, the subject was taken up by some writers, it was omitted by the majority. Works on mental science and psychology in our day have all something—some of them much—to say about attention, but this was not the case in similar writings even in the eighteenth century, not to mention earlier periods.

It is not at all wonderful then that attention has been variously described as either sensation, feeling, intellectual activity, or effort of will; still less surprising is it that confusing and opposing notions have arisen out of partial views of attention, and which have their roots in one-sided views of the human mind. In these conflicting theories, however, there is always a dualistic view, expressed or implied, and it is the aim of this work, in part, to point out and separate these two views; at the same time there is no conscious attempt either to project into any opinion some notion not clearly in it or to force all opinions into one pattern. We strive to use the word *physio-*

logical where there is any reference to the body, its organs and their activities; contrarily, we use the word *psychical* to designate mental facts which come or can come into consciousness. In this distinction we are warned that the psychological and the physiological fields blend together, and that, in the final analysis, all attempt to differentiate them fails both in theory and in experience. The division is a relative one, but it will be seen that it is justified by the descriptions of every writer on the subject of attention.

It is due to many writers and to the author himself to state that, in Chapter IV of this work, the theories and conclusions of a large number of experimental psychologists have been purposely omitted ; these conclusions are but briefly expressed, while they are also included in the theories of others herein summarized. The author is aware that there are some views included which might, for this reason, be omitted, while there are others not referred to and which perhaps ought to have been presented.

The aim of this review is two-fold : to present in a systematic way the various views on attention through the ages, and also to discover more definitely what is meant by attention as far as regards each human being.

ATTENTION.

A HISTORICAL SUMMARY.

CHAPTER I.

THEORIES OF ATTENTION TO THE TIME OF HOBBES.

There appears to have been no positive discussion of attention during the ancient and the middle ages, and the subject is but barely referred to or often only distantly hinted at. Early instances of the effects of attention are described, but these effects were recorded either as one among a series of striking facts or as explanations of memory and other phenomena related to attention.

A few points are necessary to lead us to our starting place in this review. In the writings of the three philosophers Alcmæon, Empedocles and Democritus there is found a more defined theory of mental operations than in the works of their predecessors and contemporaries. Alcmæon conceives sensations to be somehow formed in the five organs of sense and perceived by the soul in the brain; Empedocles teaches that the first process in sensation is a physical and a psychological one, the results of radiations from objects meeting radiations from the organs of sense; this notion is modified by Democritus so far as to substitute the idea of atoms for that of radiations.

The general conception as worked out by these three men lies at the basis of Plato's psychology.

With PLATO* begins the history of the discussions on attention. Here it is necessary to clear away some of the Platonic verbiage, restate the physiological speculation and gather up the parts of a psycho-physiological system into one whole. Impulses are the joint results of emanations from the objects and from the sense organs ; these, forming sensations, are carried singly or many together by various trunk lines to the three seats of the soul in the upper and lower thoracic regions and in the brain ; some of the impulses may fail to reach the centers, while, on the arrival of the others, conscious perceptions and feelings arise in the soul varying with the nature and degree of the impulse.

We may now collect Plato's many references to attention, noting that he uses the word but not as a philosophic term needing explanation, and also that germs of many modern notions lie scattered in his hints and views,—shadows of the Ideas to come. On the simplest sensation at the center, or on the slightest contrast from several sensations, there is, he teaches, a nascent operation of mind by which it is determined that some object is affecting the senses, and herein we have the earliest and simplest possible exercise of attention through either stimulus or contrast. Again, he says the sensations are often confused or contradictory, in which case the soul sets to work to discern the different and settle the differences, which it does by effort,—and herein is a reference to the intellectual activity in attention. Further, he points out, pleasures, pains and thoughts have various degrees of intensity produced by greater or less contrasts in the impulses, which case presents intensity of attention as dependent on the amount of contrast in sensations, and also as the cause of the various degrees of vividness in thought and feeling. He hints at the value of repeated attention in experience by asserting that practice makes the organs of sense to be keener and the resultant perception to be more distinct. He classifies attention as two-fold by speaking of observation through the organs of the body and of reflection upon the inner workings of the soul; and then he touches on the relations to feelings and desires—"Philosophy begins in wonder," so also "We often want to determine the confused in sensations"—in which statements the dependence of attention on feeling of some kind is avowed. The connection with will is not omitted:—in the sense all is flux and beyond our control, but in the intellect we may avoid sensations from without and pursue a process of reasoning in logic or in mathematics, wherein is demonstrated the voluntary nature of attention in reflection, and also its continuity. Once more, comparing memory to wax, he illustrates that "when we wish to remember anything we hold the wax to the perception and thoughts," in which he touches on the value of attention to memory. Finally, he in one place defines attention to be a "motion," which, he says, informs, improves and preserves the soul—here using "motion" as a term for activity of mind, and through the analogy of the movement of the eye in attention, furnishing a conception which is easily the most remarkable of all the notions concerning attention during the ancient and middle ages. These are all the references we can find in Plato's writings.

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* *Republic*, Bk. VII ; *Timæus*, *Philebus* and *Theætetus*.

It is to be remarked that the statements of the great philosopher are not to be taken in the strict sense of modern psychology, but only in a general way, for he varies in his statements and figures of speech, and often takes grounds which he afterwards abandons.

To summarize, it may be said that, broadly interpreted, Plato means as follows: Attention is a motion of the soul; this motion arises on confusion or contrast of impulses and on various feelings; it is a motion essential to consciousness, and under control for cases of reflection but not for those of observation; it is the chief factor in the feeling of intensity; repetition of it increases the susceptibility of the sense organs; and, finally, it is vital in memory.

We turn now to the next great thinker of ancient times. The psychology of ARISTOTLE* is an advance upon that of Plato in general, but is inferior with respect to attention in particular. The human soul is now considered not as having three parts but three functions through three faculties—the nutrient, the sentient and the rational; while there are no such things as radiations from external objects or from organs, but only media between object and organ for all the senses save that of touch. We are, on the other hand, furnished with many abstruse distinctions, especially between "potentiality" and "actuality," "matter" and "form," "active" and "passive," and "object" and "organ of sense," all of which discussions we shall pass by at a distance.

To gather up from the Stagirite's works the meager materials given on attention, the following will give that author's main positions, and in it we shall use the word "idea" for his term "form." Sense perception is concerned with object, organ of sense and sensitive capacity; here the idea of the object and not the object itself is perceived, while perception is a mean between the two extremes, the idea in the object and the idea in the mind previous to stimulation. Thought, he says, requires a rational capacity and imagination, the latter as a connecting link with sense perception. The soul, in these two capacities of the sentient and the rational, is pure idea, and through the two capacities receives ideas only; in both cases it is first passive and then stimulated into activity on occasion of these ideas; and, finally, the desires within are the real stimulants to all activity. He speaks of a "distinguishing principle" which we may regard as an act of attention, and which, he says, separates the sense perceptions and discriminates one sensation from another. Finally, and at variance with all modern Hegelianism, our author teaches that the object as form, and the person as sense capacity, are two before the act of perception, but after this process "they are made to be the same."

**Met.*, Bk. XI, 7 and 9; *Psychol.* (*De Anima*), Bk. I, 1; II, 3, 7 and 11, and III, 1–4.

Worked out to its conclusions, the system teaches there is attention in the fields of sense and of thought, *i. e.* in observation and in reflection; in the former, attention is a sentient activity and the result of an external stimulus upon the nervous organization; in the latter, attention is an intellectual activity aroused by desires on occasion of the presentations in imagination. In accordance with this conception, the attention caused through external objects is beyond our control, while that originating in reflection is a matter of personal volition. He also asserts that we can give attention to but one object at once.

In brief, Aristotle's theory is that there are two classes of attention, the voluntary and the involuntary; the latter produced by impulses from without, the former arising on images from within and controlled by desires ; and that all conscious attention is applied to but one object at a time.

At this point it is worthy of notice that neither Plato nor Aristotle considers attention to external objects to be under our control : the organs, as always open, must receive every stimulus that comes along, and this impulse cannot be avoided in the sense. It was, perhaps, the notion of the times as well, and it might be styled the earliest age of Sensationalism, when not only all thinking was regarded as "sensations transferred" through imagination, but the mind was considered to be at the mercy of a universe of stimulations and sensations through the non-control of attention in the external organs.

One of the phases of attention treated of in ancient times is its relation to memory, and already hinted at, as we have seen, by Plato; in any direct discussion of this subject CICERO* comes first. Deploring the antagonism which philosophers had set up between sense and reason, himself necessarily unable to differentiate peripheral from central nervous processes or to distinguish impulse from sensation, and also considering mind to be the source of the senses as well as active, "directed to what moves it" and appropriating the same, he presents a view regarding the influence of age upon the operations of memory and intellect. The efficiency and the continuance of both powers in later life depend, he says, upon attention and application, but with this he seems to have had not even a

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***Academ.*, Lib. 2, 7 and 10; *De Senectute.*

suspicion of the effects of diseased and exhausted brain upon attention and memory.

The Roman thus regards attention as a psychical effort, and one which supplements physiological deficiencies in old age. Even the error in this conclusion is, like many another, an index to a truth discovered in later ages.

While we cannot say whether Cicero regards attention of primary importance in memory, nor whether he considers it to be as important in early life as in old age, QUINTILIAN* takes up these questions and not only treats of memory but deals with attention in other directions, and throws out excellent hints concerning training the power of attending. He teaches that attention is a valuable factor in memory for each stage of human life, but, beyond this, it is even less than secondary to arrangement of the matter to be memorized and to the act of constant repetition. His farthest insight does not permit him to see that his "arrangement of matter" is but a judicious association process, and that practice and repetition are general operations of attention, while he does, however, dimly apprehend the latter relation and perceive that "a greater degree of attention" is secured by practice.

Turning to other features of the subject, the great rhetorician appears to be the first to use the figure of fixing the mind, like the eye, on an object, which figure has become a classical metaphor in psychology. He also takes up the question whether there can be several objects simultaneously in consciousness, and, contrary to Aristotle, decides that many sensations and objects can be attended at once. One of his examples is that of the harper who sings as he plays, and thereby attends at the same instant to sensations of sight, sound and touch; and he is here especially emphatic, asserting that when there are several objects or sensations at once the mind cannot be confined to one only. He refers, further, to the hygiene of attention by speaking of the value of health and good digestion to this act in connection—though but inferentially—with their effects upon memory.

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*_Institutes_, Lib. I, 12, and X, 2.

In summarizing we may say: Quintilian discusses attention more fully than any one before his time as regards its relation to memory, viewing it, however, as only an incidental factor of the same; he hints that attention has important physiological conditions; and he is the first to distinctly advance the two great ideas of the focusing of the mind in attention and of conscious attention to several objects at once.

The subject of memory receives extensive treatment from Plotinus,* but while he commends the value of practice, he perceives neither any physical nor any psychical connection between it and attention. He is of interest to us in this discussion because he is as complete a mystic as we shall meet with, and because of the relation of attention to mysticism. His peculiar psychology is based on the idea that the soul as one is yet in many parts of the body at once, and his writings hint, but only hint, of a conscious and an unconscious attention. In the domain of sense perception, which he calls the "earthwards leaning of the soul," the conscious attention is dimly set forth as a basis of individuality, because of the distinguishing of objects by the soul through the channels of the senses, and which distinguishing is but another form of Aristotle's

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**Ennead* III, lib. vii; IV, lib. iii, vi, and vii, sec. 6 and 7.

"discriminating power." Unconscious attention, itself also indirectly set forth, is, however, the subject most attractive to our Platonist. It is manifest, according to his descriptions, in contemplation, in the utter rejection of speech and sensible images, and in the silent dwelling upon ideas, especially upon the one idea of God alone, until the individual no more sees or knows sensible things, but becomes a part "of the intelligible world and ascends to divinity." In this way the operations of attention are traced from reflection upon ideas through fixation of one single idea up to unconscious attention in the ecstatic state, but the nature of the acts as phases of attention dawns neither upon Plotinus, nor his century, nor upon many centuries thereafter.

A step in advance is made by AUGUSTINE,* who more clearly outlines the processes of attention in memory, coming very near to that subject called "apperceptive association" by Wundt. His theory is that the outward observation and the inward reflection are a species of concentration of ourselves upon the object, and this process connects the object better with others already within the mind, enabling us also to recall it better. This leads him further to say much about a "clue" in the acts of recollecting. Here, he says, the mind holds on to any hint it may have of something desired to be recalled, and determinedly keeps down all irrelevant thoughts and images until the object sought stands forth in clear consciousness. In this statement we have the idea of attention in reflection worked out in a direction quite different from that hinted at by Plato and Aristotle, but after an interval remarkably long, and we have here a bold

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***Confessions*, Bk. X, secs. 12, 13, 18 and 28.

anticipation of the associative and the inhibitory processes of attention as brought out by modern psychologists.

It must be remarked, however, that, like Quintilian, the great Bishop of Hippo treats of attention as a very secondary subject. Our gleaning from him results in this : attention is an active psychical operation, associating images and ideas for memory, and inhibiting images and desires in recollection.

Turning now from the general subject of memory and from those who wrote upon it, we find that the relation of attention to consciousness is a large question, and the only other phase of attention discussed up to the time of Hobbes. First in this field is the issue which Quintilian thought he had settled as against Aristotle, viz. that there can be many objects attended at once in consciousness. A simple indication of the views taken may be sufficient for the purposes of this review.*

Agreeing with Quintilian are, especially, the three great opponents of ancient realism—DUNS SCOTUS, his pupil OCCAM, and BIEL, the disciple of the latter; while, besides others who take this view, there is MARSILIUS FICINUS, the last advocate of the idea in the period before the seventeenth century.

Opposing this idea and developing the notion of their master are such Aristotelians as AQUINAS, his disciple HERVÆUS, and much later the ecclesiastic CAJETANO, in addition to others of the same school of thought.

There is also developed another phase of attention in its relation to consciousness, viz. that there can be no consciousness without sense stimulus and without attention, and this is worked out under the conception that attention is the first act of the soul in its union with the body. In the speculations of the middle ages the question of the origin of man has its prominent place, and there comes to be a larger view of the effect of sense impulses in first awakening consciousness in infant life. Plato's doctrine that attention is the first step towards the consciousness of any particular impulse extends now to the idea that all consciousness is primarily aroused through the organs of sense in the infant state. Especially does AVICENNA* develop this idea. According to him, the soul is at first out of all relations with the body in infancy, though within the body, and so without sense presentations of any kind. There are then, he says, two ways by which union with the body takes place in infant life, and one of these is the soliciting through sensations. Here we have the germ of the doctrine so much emphasized in the sensational school of philosophy, and at the same time the truth, brought out by experiment, that sensations are necessary to attention and that the latter is a first step in consciousness.

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* See Hamilton's *Metaphysics*, Lect. XIV.

We have now traced what is developed in our subject through the early and the middle ages; it remains to ascertain the teaching of Bacon and Descartes, as introductory to the earlier study of modern times.

We can find only two references to attention in BACON'S† works, the one a mere hint pertaining to methods, the other a direct statement concerning memory. With reference to the former, we need recall that Bacon is for a "new psychology," that he deplores the depreciation of the senses in the ages before his time, and that he deprecates the preferences given to study of states of consciousness alone, sounding often a call for better attention to the much abused senses, and strongly indicating, if not in so many words, that introspection is a very old and firmly enthroned idol in philosophy and science. In addition, he very correctly points out that all discoveries up to his time have been only great surprises, and all invention has been considered but the merest accident, because there has been no concentrated attention applied in observation and experiment.

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* *Psychologie*, Deutsch. Morg. Gesel. Zeit., Bd. 29, S. 335 folg.

† *Works*, Vol. III, p. 384; Vol. IV, p. 412; and *Nov. Or.*; Bk. II, Aph. XXVI.

Taking up the latter reference—that to memory—Bacon's contribution is quite an addition to what Quintilian and Augustine have already stated, and he places attention as of primary, instead of secondary, importance in the representing process, making the clear statement that attention is of more value than repetition or any other aid to memory. With this is also the doctrine, in germ, that expectant attention adds to the ordinary kind by giving the object the most complete registration in memory. His direct references to attention are found in one brief aphorism.

It may be said that Bacon regards attention as altogether psychical and essential to memory, while it is also the most important mental operation concerned in discovery and in all experimental science.

We close the discussions in this chapter by a reference to DESCARTES. In the last analysis, attention is, according to him, the act whereby material things are known to the human mind, that is, it is "a certain application of the cognitive faculty to a body which is immediately present to it" (the intellect). The body is present to mind in imagination, he says, and this representation of the object is abundant reason for the certainty of its existence, without as well as within the mind. He says in effect, it is imagined, therefore it is. For this process of representation a special effort of mind is necessary, and denominating this the act of attention, we have all the teaching of Descartes which bears on the subject.

What now is the progress of the discussion during the ancient times, the mediæval ages, and the XVIth century? It is not to be imagined that more is not said and written than is recorded in this chapter; it is believed, however, that no other conclusions are reached, no other vantage-ground gained, than what will now be summarized. On a first reflection it is a matter of surprise that the discussion of attention is so meager during a period of twenty and more centuries, but there were so many subjects of speculation which are no longer such for us, there were so many unsettled problems which are no further questions at issue, that the view of things from their standpoint, not from ours, completely shut out the subject of attention. New conditions and new methods not only develop new subjects for thought, but bring out into the light of inquiry mental phases and activities which have long been unobserved and unquestioned; we here have a new psychological subject, scarcely yet come into clear consciousness at the beginning of the seventeenth century.

The following is a summary of what has been reached. Firstly is the physiological view: attention depends upon the strength and variety of the sense impulses, and registers these as conditions to memory; it is either an involuntary or a voluntary use of the organs of sense, and increases the efficiency of these organs; and, lastly, it is much aided by the better physical condition of the body. Secondly is the psychical view: attention is a sense of being moved or impressed, and, so far forth, involuntary, but is also a sense of activity, and hence has its voluntary phase; as involuntary, it is a discrimination of sensations, but as voluntary, it is a reflection on mental acts, inhibiting sense perceptions; further, it is influenced by motives, it gives the feeling of intensity, and the notion as to the number of its objects for any instant varies from only one to an indefinite number; while, finally, attention is a focusing of the mind upon one or a few of its many objects.

It will thus be seen how many questions have been started in a vague way as aspects of the subject in future discussions. The clearly stated points are three: Attention in an act of mind, and (1) is motion, (2) can be directed to only one object (as say some), or to several at once (as say others), and (3) both fixes the object in memory and aids in its recall. It is noticeable that all these conclusions are those given in introspection.

CHAPTER II.

THEORIES OF ATTENTION FROM HOBBES TO FECHNER.

We now enter upon a period of more direct discussion of attention. This is introduced, though somewhat indirectly, by Hobbes, who is very appropriately called the "father of modern psychology," and to whom we owe, if not "the foundations of the psychology of to-day," as Tulloch says, at least the basis of that science as held before the time of Fechner.

THOMAS HOBBES* uses many terms now obsolete in the sense he gives them: "phantasm," borrowed from Bacon and the Greeks, means any presentation whether from impulse or ideation, and "animal spirits" is used to denote impulses in the nervous system. The term "motion" plays a great rôle in his theory, and is a comprehensive word, including both impulses and all nervous concomitants of ideation and emotion, while it is also the physiological phase of attention and the most important aspect of it treated by Hobbes.

When impulses from two objects are produced, these blend, he teaches, and give but one presentation, the character of which is determined by the more vehement impulse: the result of this is the conclusion of Aristotle and Aquinas, that there can be only one presentation to occupy the attention at any one instant. Again, in all logical processes, the mind keeps up a constant and well regulated train of thought, and this it does by means of an end perceived and fixed upon, enabling the thoughts to be guided and concentrated upon one object; this fixation of the mind on ends, whether causes or effects, and the consequent inhibition of irrelevant things, constitutes our author's contribution to the subject of attention. The operation is brought out more clearly as he discusses "deliberation," wherein the mind is represented as turning from and returning to each of many motives, and, gradually excluding one after another until but one remains, it concentrates on this motive, which by that act becomes the will, while the process involves the two acts of involuntary and voluntary attention. Further, he dwells with more detail than Augustine upon the effort of attention in recalling an idea to which we have some "clue."

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* *Works*, Vol. I, pp. 394-6; Vol. III, chaps. I-IV; and Vol. VI, chaps. I-IV.

To summarize Hobbes' statements: attention is given to but one object at once, is an inhibition in reasoning and in recollection, is chiefly voluntary, and in deliberation is an arrest of motion or a narrowing down and concentration of the mind from several successive objects to one alone. The latter notion leads to the clearer and somewhat different doctrine of Leibnitz and of Wolff.

LEIBNITZ'S* doctrines concerned in attention are those of the infinite, all-mirroring monads, of pre-established harmony between all conditions and combinations of the monads, of the imperceptible gradations in these states and compounds, and of the distinction between perception and apperception. On the physiological side, and illustrating it by the single

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**Nouv. Essais sur l'Entend. Humain*, Avant Propos, et Liv. II, chaps. XI, XIX; *Princ. de la Nature et de la Grace*, Sec. 4.

impulse in the ear as composed of the effects of many waves to one on the sea-shore, or setting it forth by the surmise that any light or color impression on the eye is the result from many primary rays of light, he teaches that our organs receive an infinite variety and number of impressions, and that there is a gradual accumulation of the same as a basis for intensity and contrast; and herein is the germ of the theory concerning a threshold for organs, nerves and centers. On the psychical side, he says, there is also an infinitude of perceptions, having a variety and intensity similar to those of the impulses, which are necessarily forming while we sleep, and which are neither remembered, clear in consciousness, nor available in thought until we discriminate them in some act by selecting a few or but one out of the mass. This latter process is the act of apperception, and is that which furnishes Wolff with clear groundwork for a theory of attention; but we may substitute attention in a general way for apperceiving and follow Leibnitz further. The act depends upon the novelty or the strength of any perception, and also the attractions of that perception for all the impressions within, *i. e.* for our desires. In introspection we are conscious of our own activities by attention to each state; in observation we know the object by attention to the corresponding perception of it; in fact he teaches apperception, memory and consciousness are different phases of the same result, and attention is presumably the basis of each. He refers to voluntary attention with its different degrees, to attention under the heads "contemplation" and "consideration," to "study" as attention for purposes of knowledge, and to other divisions which are not of consequence here. Finally, in the doctrine that all perception is passive and an interior state representing external things, and that all apperception is active and the reflected knowledge of the interior state, we have the grounds for the distinctions of attention as sensory and motor or as passive and active.

We find thus, in Leibnitz, the idea that attention is a narrowing down of consciousness to a smaller number of objects or to a single one, it gives clearer consciousness and better memory, it is either active or passive, and it is occasioned both by the accumulation, strength and novelty of the sense impulses and by the preferences from habits.

The narrowing down of consciousness must, in accordance with his system, be viewed as having a vast range, beginning with utter unconsciousness, and extending through every conceivable grade up to clearest consciousness.

CHRISTIAN WOLFF* takes up Leibnitz's main principles and develops them further, adding contributions of his own and discussing the subject more systematically than all his predecessors together, doing so in a method direct and clear. The student of the subject now meets for the first time, chronologically, such ample material that he can eliminate and condense instead of infer and expand, while he grasps the complete system. Here we find the terms then current in Germany—"faculty," "apperception," "composite perception," and that dualism which denies the influence of body on mind or *vice versa*. As to the latter, Wolff teaches that there are desires in the body separate from those in the mind but each corresponding to the other, while this correspondence is explained by the assumption of a parallelism between the two classes. Along with this, however, is such a vigorous discussion of the various influences affecting attention that, had it been followed out, would have developed psychology an hundred years before the time of Fechner and his contemporaries.

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* *Psychol. Emp.*, Sec. III, 287 seq.; *Psychol. Rationalis.*

Perception, he says, is the general result of impulses through the means of an open organ and a passive mind, and is simple or composite, depending on the variety and the differences in the sense impressions; the clearness of the whole depends upon the clearness of each part, and here attention comes in as that operation in which the mind in its turn reacts, singling out and distinguishing amid the perceptions. Attention is a "quality" of the mind, or "that causing one part of a composite perception to be more clear than the other parts is called the faculty of attention," while the resultant is clear consciousness, which depends in its turn upon attention as an act of will. He takes much pains to reiterate under various forms that attention is a "free act."

He deals at great length with the excitements to attention: in the normal man, sense impulses prevent attention to fancies and images; a few sense impressions are more effective than many; and the stronger impulse secures attention above the weaker,—wherein the stronger impulse is not explained. Again, attention is preferably given to objects producing more definite impulses, is yielded still more to those objects creating similar impulses, and most of all to those arousing impressions connected with the appetites. On the other hand, objects producing monotonous impulses force attention away from them.

After the manner of Aristotle he classifies mind into inferior and superior faculties, and attention comes in as the point of difference between the two; here is a theory the credit for which is to be given to Wolff, and of which the number of adherents is constantly increasing, though abandoning the use of the term "faculty." Stated fully, the theory is: attention causes clearness of knowledge, and clearness of knowledge distinguishes man from beast, understanding from sense.

The view of Wolff is briefly as follows: attention is an act of the will, narrowing down and concentrating consciousness under the influences of internal preferences, but more of external impulses, and it marks the difference between sense perception and reasoning, and between brute and human kind.

Wolff deals more with the physical influences of attention; we turn now to MALEBRANCHE,* who takes up the subject in respect to its psychical influences, and especially in its relations to pleasures and pains. He adopts Quintilian's figure of attention as a fixation of the mind upon its objects, and finds the feelings of pleasure or of satisfaction to be a necessary inducement to the act. Interest is all-prevailing in attention, he says, and controls it completely, for attention is an act of will, and will is controlled by interest. He confounds the physiological excitations with their accompanying feelings in consciousness, and thus makes the "inducements" in the objects stimulating the organs to be an additional interest leading to attention. Next, he enters into a long dissertation to show that the feelings of pleasure from sense excitation are far more powerful than those from abstract thought and imagination, and hence has the superior control over attention; the explanation of this lies, he says, in the fact that sensations from without are more direct, are "modifications of the mind" and "fill its capacity" in a way that ideas and reproduced sensations cannot do. Despite the unsatisfactory nature of this explanation, we have here brought out definitely and for the first time, chronologically, that which for ages had been at the basis of the discussions of ancients and moderns, viz. that sense objects affect attention more than ideas. There are degrees, he states, in this capacity to attract attention, and these are graded through means of imagination and memory all the way from highest intensity in sense impulse down to the lowest in abstract thought.

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* *Œuvres Recherch.*, Liv. VI, chaps. II et IV.

He also brings out another idea of the ancients and gives it clearness, thereby introducing a division adopted by most writers since his time, and which he calls observation or attention to the "completed perceptions of an object," and, secondly, reflection or attention to the operations of the mind. Leibnitz and Wolff use these terms, they are the groundwork of Locke's classifications, and under our author assume a new significance in the discussions carried on.

On the whole, Malebranche's conception of attention is chiefly from the psychical standpoint: it is the steady, voluntary direction of the mind towards particular sensations or thoughts under the exclusive influence and control of feelings.

We shall here include the theory of G. VICO,* the only Italian whom we quote in this chapter. Classifying the activities of the mind much as did Aristotle, he considers the senses to be both the source of feelings and of the objects of thought, and advances the curious idea that objects and feelings are somehow

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*Flint's *Vico*, pp. 129–132.

lodged in the bodily organism, and from thence are produced on occasion as contents for the mind. This makes sensation to be the result of attention instead of the latter an effect of the former, and contains at least a truth in the well-observed fact that sensations are increased by attention to them. One of Vico's arguments for his statement is the erroneous inference that men often do not feel pain from wounds in battle until the conflict is over because attention is first given to something else, and afterwards calls out this pain from impulses lodged in the body, wherein our author overlooks the effect both of a stronger and of a continued stimulus.

Hobbes had revived the doctrine of Aristotle and the schoolmen, that all which is in the intellect comes first from the sense. Among British writers of this period, the doctrine takes the two forms of Sensationalism and of Association Psychology. We shall first glean the theory of the author who wrote "On Human Understanding," nor will this detain us long.

It is remarkable that, in dealing with the senses and with observation, **John Locke*** is not led to a consideration of attention; this may be attributed to the fact that he is so fully engaged with a view of the mind as passive, that his very slight admissions of activity scarcely allow any discussions of the motor factors, even in his long chapters on Power and on Will. Like Bacon, he simply refers to attention in its relation to memory, and here he gives it a low place, regarding the feelings and repetition to be superior factors.

Neither will it require many words to present the views of the English association psychologists. **Hartley's*** views might be presented along with those of Avicenna, as regards the relation of attention to consciousness. With "nervous vibrations" as a psycho-physiological basis of a theory, he treats of attention in connection with wakefulness and sleep. Where there are no nervous impulses, he thinks, there is no attention, and sleep ensues; the foetus sleeps because no impulses are impressed upon it, at birth it awakes because of vigorous organic impressions received, it sleeps on cessation of these stimuli and wakes on their renewal. In this theory attention is entirely at the mercy of impulses.

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* *Essays*, Bk. II.

In ABRAHAM TUCKER* the ideas of Quintilian, Wolff and Malebranche are popularized. Attention is, he teaches, a turning of the "mental eye" by a "culling of particular objects from the whole number exhibited to view," and the largest possible number of objects attended at once is not more than four; while, as to the "turning" of the mind here or there, that is decided by interest. He also says the mind fixes its notice upon objects affecting it agreeably, and the test of the agreeable is this notice because of the satisfaction felt. We have here only the hints of a system.

One other English writer of this period deserves mention. The conception of TOWNSHEND† is of value as being among the first of those working in the line of hypnotism. He places feeling, perceiving and attending together, in intimate and necessary sequence, all as stages of consciousness; each one is stronger, through reaction of the next one backwards, in proportion as that next is more clear; while attention especially reflects backwards and heightens perceptions. Further, he says, all knowledge begins with attention.

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* *Light of Nature*, Vol. I, chap. IX.

† *Facts in Mag.*, pp. 287–358.

Applying his theory to a study of the nervous conditions and disturbances in the hypnotic as compared with the normal state, he regards attention as the measure of the mind's strength or weakness, while attention itself is measured by the excellency or otherwise of the memory which results therefrom. This latter doctrine excludes the theory afterwards current, viz. that the hypnotic state is due alone to concentrated attention. In brief, Townshend makes it clear that consciousness, knowledge and memory depend on attention, while he dimly sees that attention is itself dependent physiologically on the endurance of the muscular and the nervous force, and he furnishes us the best conclusions from this reference to English writers.

The discussions of the French Sensationalists and their critics open out a larger field than that presented thus far in England, and develop new phases of attention, so that if our quest in France takes us a longer time it rewards with greater results.

E. B. CONDILLAC* regards attention as a faculty, and he ingeniously connects his remarks on the subject with his supposed case of a man outwardly a statue of marble and gradually endowed with one organ of sense after another, which statue may be compared in part with Hartley's assumed "fœtus." Supposing the ear to be the first sense organ, the result is the first sensation for attention, the first perception for knowledge and the first consciousness of mental acts. With other organs in succession there are more sensations attended, more perceptions known,

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***Œuvres. Essai sur l'Orig. de Connais. Humain; Logique; Traité des Sensations*, Tom. I, II, et XV, liv. 2, chap. VII.

and all the objects and ideas are connected in memory in the same order in which they are attended. Following Malebranche and Locke, he relegates the ultimate choice of impulse to be attended to the "temperaments," "passions," "states" and "needs" developed in experience, while with Wolff he makes consciousness increase in proportion to attention. The only active phase is from the side of the body and consists, he says, solely in a directing of the organs of sense by adjustment to the stimulus, this process being variously termed "stronger" and "more active attention." In consciousness, attention is almost wholly a passive affair. This theory furnishes a complete determination of attention through the sensory nerves, and presents a logical conclusion from the doctrine that everything in the mind comes from sensation. In Condillac's view, attention is a receptive faculty, it admits what is agreeable to the organism, secures consciousness of objects, and is the first step in knowledge.

CHAS. BONNET* claims that he is the first to analyze attention and also the first to show its different influences in the varied abilities of mankind. The second claim is contested by Helvetius, who wrote at very nearly the same time and withal with a clearer method; we here consider his first claim and present his analysis as condensed from a mass of writings. Technicalities and peculiar theories pervade his work, chief of which are the following: "Nervous vibrations" are plainly meant for nerve impulses; "nervous fluid" and "animal spirits" indicate both nerve impulse and

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***Essais Analytiq. sur les Fac. de l'Âme*, chap. VII et XIII; *Essais sur les Facultés, abrégée*, chap. I et XX–XXI; *Essais de Psychol.*, chap. VII; et *Philolethe*, chap. I.

stimulation by nutrition from the blood; "flow of the fluid" suggests transmission of impulses as well as increased circulation; vibrations at the central endings are converted into sensations; pleasure and pain come from a comparison of sensations; no two objects stimulate the same fiber, but their impulses have separate tracts to the brain; certain fibers connected with processes of imagination are more easily excited from within, while other fibers connected with processes of thought are moved with greater difficulty; and lastly, mind itself is more physical and physiological, the total operation of the nervous organism. Discoveries in the anatomical structure of the nerves and of some of their physiological relation make Bonnet, as well as Hartley, to feel that the key to thought and to mind has at last been found. He uses in psychology such methods as he employs in general zoölogy (biology is not yet a distinct subject), and he aims at reducing all facts to a few fundamental principles which are often repeated in varied form.

From the side of consciousness, attention is an action or reaction of the mind on the occurrence of sensations, while, more explicitly, this is the feeling of a motor impulse upon the incoming of sensory impressions; again, he says, when the sensory impulses are several, the sensation of greatest pleasure decides the direction of the activity; and, finally, he agrees with Quintilian that we may attend several objects at once, limiting the number of them to six.

On the other hand attention is governed by the sensory impulses, and among many by such as relate most to the welfare of the body, also by that nature of the organism through which all its operations are for good and not for harm; all of which is determined by a comparison of sensations and by the constitutional desire for feelings of pleasure. Further, attention is generated by the sensory impulses and always requires changes in the latter, which may be accomplished through different kinds of impulses or through varied degrees of the same kind. Again, he calls attention a motor impulse, "an exercise of motor force," or, as Volkmann well puts it, "a centrifugal innervation of brain fiber"; and along with this motor impulse towards any stimulated part the vascular processes in that direction increase, this decreases circulation in other directions, other objects cannot then easily create an impulse, and this is why we perceive only the object to which we give attention, as also perceive it more clearly and for a continued period. In the manner just described attention both increases the impulse and prolongs its duration, while the mode of doing it is at least an ingenious explanation of what Quintilian had long ago observed.

Increased circulation in the part or organ produces a more pleasant feeling there than elsewhere, and thus the motor act of attention, he teaches, is a matter of choice; and so, as a conclusion, choice as well as the inhibition of other impulses, and attention, are each physiological acts through the circulatory system and through afferent impulses. Further, more delicate and less used organs are less liable to this increased circulation, and thus is explained the fatigue accompanying attention in the use of these organs. When stimulation ceases there is a gradual return to the normal circulation, with cessation of motor action, though thought goes on drawing out other thought through vibratory connections and either in the form of imagination, reverie or reasoning. Finally, the theory attempts to explain the difference Malebranche and others found between attention to images and attention to thought: the assumed sensible fibers "to which images have been attached are most easily moved," but the fibers for notions require more effort to set them in motion. Thus, thinking is of a higher order because of the greater concentration of attention in the motor fibers, while imagination is more a relaxation of the same.

With Bonnet's use of "nerves" and of "sensible fibers" he cannot avoid ambiguous terms: one such case is the statement that "attention keeps up a certain exercise of the motor force of the mind upon the brain fibers," in which, on one hand, the word "brain" can scarcely be substituted for "mind," and on the other the author hardly means that "motor force" is in the soul. Also, either through the habits of language or as a figure of speech, he partly avoids the grossly materialistic view of attention as an impulse of nerve, only by calling it an activity of mind. Finally, the supposition that the image-bearing fibers are the most easily set in motion, logically leads in his theory to more sensations and this to greater attention in imagination, but not to relaxation of attention as he makes it. In brief, Bonnet's conception is: attention is a central reaction on a sensory impulse whether set in motion from within or from without; this reaction is a motor impulse back to the corresponding fiber or organ of sense, and augments the sensory impulse. Omitting the materialism and the limitations of this theory, we must regard it as a long stride towards the conclusions of the latest psychology.

We turn next to a critic of Condillac. C. A. HEL-

VETIUS* discusses two questions from the standpoint of attention, viz.—Is the mind born with all its powers complete, and are the differences in the mental abilities of people due to effort or to innate power? To the first his answer is in the affirmative, and to the second the reply is in the following line of argument. It requires a great deal of attention to learn to read and even to learn to talk; such attention, in its operations, develops other capacities; wherefore, all persons who speak and read have a power which, suitably exercised, can bring them to the highest intellectual development. This power is, however, not used alike in all people because of passions, preferences and necessities, but its exercise makes the sole difference among all adults in the normal condition.

He makes desire, as founded in the lower or bodily sensibilities, to be not only the main cause of attention to any particular sensation, but also to be the measure of the force of attention, and this desire has its two phases of love of pleasure and fear of pain. The conception here would be very strong with the added idea of accumulated tendencies in the sensibilities through heredity; at the same time it is defective in the omission of the higher or intellectual emotions which play so great a part in man.

Our author's most novel contribution, however, is the theory that fatigue of attention depends on the gradual weakening of the determining desires. According to Helvetius: attention is a power bestowed alike upon all, capable of being developed according to the physical constitution and the surroundings, and whose development explains the differences among mankind in skill, intellect and genius. Instead of Condillac's "faculty" we have here a "power" capable of immense development.

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* *Œuvres, Discours* III, chap. IV; *De l'Homme, de ses Fac. et de son Éducation.*

Another critic is A. DESTUTT DE TRACY,* who not only denies that attention is a faculty, but affirms that there is no distinct operation of attending. He says it is "a state" occurring where difficulties in the functions of the body or the mind are encountered, and so it is a peculiarity in the state called will. Especially is it an effect, he declares, but never a cause; while sensations cannot possibly be made to disappear through attention, for in this state the only sensations are those now being perceived and there are no others to solicit the will. The conclusion is that attention is a state of volition in which one or many sensations are possible at the same time.

The last critic of Condillac in this period is P. LAROMIGUIÈRE,† whose writings are frequently quoted, especially because of his strong opposition to sensationalism and because of the importance he gives to attention in the intellect. Sensation is passive, he says, while attention is active, and just as the active cannot come from the passive, so attention cannot be the outcome of sensation. Activity, he asserts, characterizes all human minds; there are several parallel activities as shown in the intellect and the will, and mental activity is the point of departure of the human race from animals. Reviving and popularizing Wolff's doctrine, he makes attention to be this point of departure, the foremost among all the activities of the mind and the basis of all intellectual operations.

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* *Elements d'Idéol.*, Tom. I, chap. XVI, p. 219, *suiv.*

† *Essai sur les Facultés de l'Âme, Cousin's Frag. Philos.*, Tom. V, 351–378.

The discussions in France so far have been but little differentiated from those in England; both English and French have carried on the inquiries around one point of dispute, that of vibrations and sensations; and thus their theories are clearly distinguished from the German doctrine of the narrowing down of consciousness.

We find a greater variety of treatment among the Scotch, whose conceptions we now take up.

In the conception of Reid* we have a combination of many of the previous views, evidently an attempt to harmonize them, and along with this some additions of his own. He regards mind both dependent and a contributor, as Leibnitz looked upon it as passive and active; like Wolff he calls attention voluntary, giving occasion, however, for the passive view by saying "for the most part voluntary"; and he maintains that without attention we can acquire and retain no distinct notion. In such an operation, he says, attention "directs, condenses and confirms the perception."

On the other hand, he teaches that there is consciousness without attention, as when we see without distinguishing objects, and so there may be consciousness without memory. Following Malebranche in contending for the influence of passion and affection, he adds this much more, that objects which move the passions attract attention more than we wish; he also uses the Frenchman's division of attention in observation and in reflection. He agrees with Wolff as regards the influence of the new and strange, but gives greater weight to their influence, asserting that they excite attention even more than interest and passion.

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* *Inquiry*, chap. II, sec. 10; *Essay*, chaps. I-VII; *Active Powers*, essay II; and *On Will*, chap. III.

He gives two reasons for the prevailing direction of attention in observation rather than in reflection: "The existence of a strong impulse to attend the object," and the too great rapidity of the mental actions for easy attention to them. He anticipates Schopenhauer by teaching that while sensations are the occasion of attention, the act is not directed to them but to the perceptions, that is, as he says, to "the things signified" by the sensations. Not regarding attention as necessary to consciousness, he differentiates the two as follows: consciousness is a general, attention is a focused view; the former is involuntary, passable and changeable, the latter is voluntary, active and continuous. We may summarize Reid's theory thus: attention is the result of will on an external stimulus, is measured by the degree of the resultant feeling, and requires consciousness as a prior condition. The contributions are two, that attention is both secured and measured by feeling, and that it is not essential to consciousness.

STEWART* deals with the subject of attention more extensively than Reid, considering it in its relations to consciousness and will, and dwelling on its time conditions. Very much as Cicero, he admits physiological factors, for the reason that intensity of attention is lost in old age when "its capacity is weakened by some physical change in the constitution," but this loss affects further experience only and does not reach to reflection and memory. Taking up the discussions on memory, he finds here the two factors of attention and association, differing from Locke and agreeing with Bacon that the former is the most important element. He develops the ancient idea of Plato and Quintilian by teaching that, because of attention in practice, the organ becomes sharpened and susceptible to weaker stimulus, and that this is especially the case when another organ is lacking, as when the blind hear better than those who see. He does not, however, imagine possible or even probable influences elsewhere than in the peripheral endings.

**Intellectual Powers*, Part I, secs. 3-5; *El. Philos. Human Mind*, chaps. II and VI.

On the subjective side he follows Reid in making consciousness independent of both memory and attention. Attention is a pure act of will, it is never involuntary, he says, and is connected with feeling. Here we are given an interesting discussion: fixed attention is impossible without feeling, he says, because the purposed end disappears through forgetfulness, while with purpose absent, will goes and attention wanders; when we have no interest and strive to fix the wandering mind on some point, there is only a "seeming attention" and the whole act gives a feeling of confusion, as if the mind were struggling within itself between constant and intermittent efforts.

Stewart discusses the time relations of attention at length, and this is his great credit that, before the age when men knew that psychical operations require time, he founded a theory on the idea that time is necessary for acts of will and for intellectual operations generally. The volition in attention, he teaches, requires more time than other volitions, more time than intellectual activity; consequently one thinks faster than one can attend, jugglers and performers execute their feats so rapidly that some are lost to the looker-on, and in the same way the mind directs acts like those of public speakers, rope-walkers and musical performers so quickly that it cannot attend to the physical results from its own efforts. He states that attention is one of the simplest of the intellectual operations, and this conception seems at first contrary to his idea that it is pure act of will: however, this only shows how he finds our mental acts to shade into one another and that it is impossible to draw close lines of distinction. Through his nearly complete rejection of the physiological factor, he objects to the term "automatic," because the word indicates that certain actions are beyond the guidance of the mind, whereas, he contends, they are only outside of the peculiar province of attention.

At the bottom of his line of argument on time, lies the notion of Aristotle that attention cannot be given simultaneously even to two impulses which may be separately attended, while all apparent notice of a number of things at once is, he maintains, but a rapid change of attention from one to another. He adds here the curious assertion that teachers, writers and philosophers retard their mental operations to give the requisite time for a proper introspection of them. On the whole, Stewart's theory is somewhat as follows: attention is affected by physiological conditions in old age, it increases the functions of the organs, it is a voluntary act kept up as long as there is interest, and it requires more time than other mental operations. His contribution of the time element is deserving of special notice, while his usual acuteness is lost in the failure to see that physiological conditions affecting age might also influence earlier life.

The theory of JAMES MILL* is a development of that of Hartley, just as Condillac's is of that of Locke. Attention, for Mill, is related to the volition, the feeling and the train of ideas; being determined by feeling in its phases as will, and, on being directed to any object, it affords that object opportunity to excite all the ideas which go with it by association. Later on in his works, and inconsistent with the earlier notion, attention is shown to be not so much the effect of the will as "the occurrence of interesting sensations." In the final analysis and by regarding conscious will as but a feeling of muscular action, our author makes the two, the feeling of a sensation and the attending of a sensation, to be one and the same. Where there are many feelings or sensations, the stronger prevails, he teaches, and so attention is the stronger sensation. Feeling and sensation are inappropriately confounded with one another in this theory, but the sense of muscular activity is a fruitful suggestion which, as we have seen, Bonnet more largely developed under the conception of motor innervation.

**Analysis of the Phenomena of the Human Mind*, Vol. II, "Will."

Quite another view is presented by THOS. BROWN,* who writes at length upon the subject, denies every particular act or power of attention, and calls it "a state," a relative state of the sensations among themselves. The conception is a modification of Hartley's vibration theory and is in accord with De Tracy's view.

The variations in the relative states of sensation, and so in the state of attention, come about in the following ways: 1. There is a law of perception by which, he says, there is just so much capacity to vividness of sensation, in the total, and thus when one or many sensations are increased in force others are correspondingly decreased. 2. The more coexisting sensations, the less distinct and intense is each, while one sensation alone exhibits the completest intensity and distinctness. 3. There is a law of the emotions by which feelings communicate intensity to all sensations in harmony with them. In explication of these laws he says: desire adds to the usual intensity by simply excluding from the field all that is not desired, and this it does by means of the adjustment of the organs and through nerve influence. Thus desire constitutes the chief factor in attention, and is observed to become greater as the impulses and their sensations become less in number; and thus also the three methods of securing attention, as given above, may be reduced even to one, that attention depends upon the number of sensations. We must discriminate this conception from that of most others by the complete absence of the active factor. With Brown, attention is mind in a conscious state of sensation, it may be distributed over several objects at once, and it includes a feeling of interest which is greater as the number of objects is less.

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* *Mind*, Part I, p. 295 fol.; and Part II, lecture XXXI.

The four men just quoted very properly emphasize the importance of the feelings and emotions of the individual in attention, and this is a peculiarity of the Scotch in general and traceable in the early influences of Malebranche. The French sensational school has its parallelism in the theories of Hartley and Brown, but its widest antagonism in those of Reid and Stewart with their doctrine that consciousness does not depend on sensation.

Having now reviewed the theories of the Scotch, the English, the French, and the early German writers, it remains to consider the Kantian theory and its first development in Germany.

KANT* himself gives us little on attention, leaving the way open, however, for many inferences. The key to all he does say is found in the three steps he discovers in the mind, namely: pure sensation or the "faculty" which contributes time and space; and the two higher "faculties" which further take up and deal with sensations, contributing also their portion to the processes of intelligence. In general, attention may be viewed, he shows, in two ways: first, from the standpoint of the higher faculties or as regarded in and of itself; secondly, from the lower view, that is, from experience. In the former view, attention is a distinguishing power, one of the subdivisions of the intellectual faculty and operating down over the sense; in the latter view, it is simply an operation of the inward sense which becomes an object of perception as any other object. In particular, he says, attention is an effort to become conscious of the sense stimuli; and here he differentiates this from the effort to become conscious of a sensation reproduced in memory, giving to the latter another name, thus taking a more limited view of attention than do Reid and others who make attention to include both of the operations, observation and reflection.

Very much as Helvetius, he regards attention as existing in the condition of a capacity prior to all experience, only requiring sense stimulation to call it forth. When it is thus called forth, there is a consciousness of some affection or impression in the mind, while without it there is no consciousness of sensation. He also regards it as a great intellectual agency, since it puts together, in the one idea of contrast, any two contrary sense stimuli. He accounts the effects of the novel to be important, but not as effectual as Wolff regards them; he discusses degrees of intensity, but in this he omits any clear reference to attention; then, again, in pleading like Cicero and Bacon on behalf of the much depreciated senses and by denying that they are the source of errors, he accounts for our being deceived about the things without us, by the mistakes made on the part of the faculty of judgment concerning sensations, and thus he lays the blame on the want of proper attention. The impulses of sense are never false, he declares, and so attention does not correct sensations but only brings them in their truthfulness into consciousness. In brief, Kant calls attention an original capacity to distinguish for the external sense only, a capacity called into activity by the external sense, and one whose activity both brings an impulse into consciousness and itself becomes an object of consciousness.

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* *Critique*, Introduction, and pp. 125-132 and 209; *Werke*, Bd. X, Anthrop., buch I, secs. 3, 6 and 13.

It is very difficult to ascertain just where J. G. FICHTE* places attention in his theory, although he frequently uses the word in the ordinary sense of a direction under volition. We sift his system and glean what we can.

The ego, he says, both posits a non-ego and causes in it an impulse, each of the two being but a limitation of the ego itself and regarded as another ego with its impulse, thus we ourselves make the outward world and our sensations from it. The impulse referred to is will and, by inference, is activity of the ego; it has two forms, one is the impulse willed in its outward appearance and called feeling or "sensation of matter"; the other is the impulse willed in its effect on ego and called presentation. In this view attention is the so-called oppositing wherein the ego is active and the non-ego passive. One other view is given and in a clearer manner: the attention observed in an act of will is practical evidence of individual self-freedom, while a result of this freedom is the absorption of the individual object into the general, and of the species into the genus, through the ego's projected object coming back to the ego again. In any case, attention is an undefined action of the mind in impulses from the body, and it has the largest, if not the whole share both in the origination and in the annihilation of these impulses.

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* *Wissenschafts-lehre;* und *Sämmtliche Werke:* Die Thatsachen des Bewustseins.

On turning to HEGEL* whose rehabilitation of the ordinary in the unwonted garb of a new system makes all things appear different, we meet the activity of attention under the guise of momenta of thought. Using his own expressions in part, his doctrines pertinent to our subject may be thus enunciated. First there is a feeling of impulse which is not known through a medium and hence called immediate knowledge; then there is a self-determination of this feeling into two factors, the notion in itself as subject and the notion out of itself as object, the latter of which is known by reference to another and so called mediate knowledge. It is necessary now to discard the Hegelian technicology and to adopt, as much as possible, the terms ordinarily used.

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* Wallace's *Hegel*, Logic, chap. II; *Werke*, Philosophie des Geistes, Bd. 7 (2), secs. 445–455.

The system regards attention as the chief operation in developing the two experiences, subject and object, there are hints as to the mode of this operation, but our author involves the operation in haze and cloud. Before the act of attention, the impulse through the sense organs is a special but yet unknown and undistinguished object, creating a feeling that there is a something in the sense and that it is the proper material for consciousness, the impulse being a psychical but unconscious affection. In the act of attention the mind bears upon this affection of itself, determines, distinguishes and fixes it as its own, so that what was unknown object in impulse is now known object in mind. Here, the process shows that before attending there is neither consciousness of the perceiving nor of the perceived: but that after attention the two correlates, subject and object, stand out against each other; the former as ego, the latter in time and space.

The work of attention is, however, limited. Attending the impulse does not bring out the object fully, but for this another and further act of the mind is necessary, and Hegel calls it, reflecting over the yet incompleted object. So also attention to the impulse does not furnish the object as an image in the mind, but only as a yet unconstructed appearance with outlines in time and space, which appearance is presented clear in the mind by the operations of imagination and of memory.

He intimates that attention is somewhat dependent on will, but he nowhere indicates that it is affected by desires and emotions. Further, he makes attention cause the singular and the individual to become the universal through reference back to the personal consciousness as the only standard of the general, just as Fichte makes the particular to be absorbed in the universal. Finally, he speaks also of attention to the workings of consciousness as well as to the bodily impulses, and attention is once defined as the perception of a sensation. In brief, with Hegel, attention brings out what is in the sense as feeling and makes it an external object, while at the same time it reveals the personal consciousness as subject.

The varieties and changes of attention are nowhere so graphically set forth as in the metaphysical speculations and the mathematical formulæ of HERBART.* As he regards both the mind and its sensations as reals and also as forces governed by definite laws, just as the reals of the physical world are, a brief sketch of a portion of his system is the only way to approach his view of attention.

As forces, the sensations interpenetrate each other with destructive effects, in a sort of struggle for self-preservation. There are many and constantly accumulating sensations in the mind at once and, however many, each one is affected in the struggle according as it has come of a similar or of a disparate organ when compared with others: in the antagonism, the sensations do not annul but only mutually arrest one another so that each is modified inversely as its intensity: and finally, the mutual arrest may be complete, at which time there is a temporary equilibrium in the antagonism; or it may be incomplete with the struggle continuing; and when a new sensation enters, all the forces previously within, and whether in equilibrium or not, are disengaged to renew the inter-antagonism of each against all others. It is indeed the picture of a ceaseless battlefield in the mind, in which the contending forces are constantly augmented and in which each warrior has a sort of immortality, for though struck down he rises again. In this conception of the strife of sensations the mind is a passive onlooker, what takes place within its domain are states of consciousness; attention is that state which is produced by the inter-relation of the sensations or by the domination of one only, and its primary cause is an incoming sensation together with the antagonisms of each of the others in the mind. The value of attention is derived by Herbart from complicated formulæ on assuming certain values for sensations under certain conditions; and, whether this value be correct or not, the long, tedious and diverse formulæ which our author works out under the various assumptions, very fitly give a mathematical statement, to the effect that attention is related to many factors and is a very compound affair.

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* *Werke*, von Hartenstein, Bd. VI, Psychologie; Bd. VII, theil I, De Attentionis Mensura Causisque Primariis.

On the positive side, attention is a possibility of the mind to have sensations and their antagonisms, and this possibility when realized becomes, he says, a stage in the larger state of consciousness and described by the term "apperception." In the beginning of attention, for any particular case, we have the threshold between sensation and no sensation as also between one kind of sensation and another; and this beginning of attention lies in the nature of the sensation, whether, as new or the old set free again, it has sufficient force to keep up a proper antagonism. He admits both voluntary and involuntary attention, but the former is greatly limited, being dependent, on the side of the new sensation, upon the strength of the stimulus and the nervous susceptibility for that new; and on the side of the old sensation, upon the degree of variation from total arrest; a case mixed enough indeed. He also calls attention active, as peculiarly affecting its factors and increasing their products during that condition in which the infant mind exists previous to the development of perception and memory. Herbart agrees with most writers that interest influences attention, but this interest is, he says, simply the old sensations preserved while not antagonizing but directing as well as making possible such new sensations as are in the direction of what is advantageous and agreeable.

We have here purposely mingled the metaphysical and the mathematical conceptions of our author, as this method best presents his theory as a whole. Many questions arise from the theory, some of which are as follows: Does the state of will affect the antagonistic representations in voluntary attention? Does interest always lie in the line of the more frequent and the stronger sensations? We may roughly summarize Herbart's view thus: attention is a state of mind resulting from the effects of the stimuli, the nervous system, the sensations themselves on each other, and other mental states; it becomes the more intricate the longer one lives, its intensity is measured by a lengthy calculation based on the values of sensations, and it is a necessary antecedent to clear consciousness. Our author covers the ground of Condillac with reference to the activity of sensations, expands more than De Tracy and James Mill the notion of attention as a state, and follows Hegel's forms of the ideas rather than Kant's faculties of the mind.

Herbart is followed closely by F. E. Beneke,* whose system is a modification of that of the former but with ingenious additions. The pupil, instead of regarding attention as the observation of the contending sensations like his master does, presents it as the notice aroused on the union of impulse with some capacity in the mind, and therefore it is passive when considered as excited from without, but active when viewed as rendered from within.

In order more fully to collate the ideas of Beneke the following explanations are of importance. "Original powers" are the capacities of the mind in seeing, hearing, and so on, and are as innumerable as the number of times we can perceive a new object; "stimulants" are the stimuli whether external or internal; a "spur" is a registered sensation or association of sensations, and is described by our author as any capacity so far made passive by the application of its energy to some impulse; while a "form" is any mental result from a grouping of sensations, such as a perception or a judgment. With these the following curious doctrines are connected, and are pertinent to the theory. A sensation may be broken up into its elementary impulse and capacity again by some new impulse for which the capacity has more affinity; also, the forming of a sensation, whether through an unemployed or a just liberated capacity, is accompanied by an awakening in consciousness.

These terms and doctrines premised, we are now at the foundation of our author's theory. The intensity of attention, he teaches, depends on the number and variety of the capacities to activity and on the number of previous sensations, being greater as there are more

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***Lehrbuch.*

of the latter subject to recall and as the former respond to a less number of disparate impulses. Then, certain things prevent attention; such are: too many stimuli and activities at once, wherein impulse, capacity and sensation are confused; so also too rapid impulses, which give insufficient time for the operation of the capacities; and finally contradictory results in the mind, where one perception or judgment is opposed to another. Further, attention is also the cause of feeling by the distinguishing of an interval and of a difference in the psychical activities, for without this differentiation there is but a simple sensation. Lastly, the greater the number of previous sensations attended and consequently the greater the amount of feeling, so the greater the attention; therefore experience and interest excite and hold attention to congenial matters in the strongest possible manner. Beneke teaches that attention goes with mental activity only and does so whether the activity is excited by impulses or by associated ideas; that attention is governed in its intensity by a freedom from stimulation through disparate organs, and by less rapidity of any stimulation; and that it gives feeling by its discriminations, or otherwise only bare sensations.

In the theories of Herbart and Beneke, with their elements of impulses, activities and sensations, uniting, breaking up and reforming again, there are at once suggested to the critic striking resemblances to certain theories in chemistry and in physiology. On one hand is the analogy of the combination and liberation of atoms and molecules, on the other hand is the analogy of the association and dissociation of nerve fibers and cells as a theory of thought. Since the time of these two writers, others have taken up the analogies, applied them to various phases of psychical life and made them explanations of mental processes and of attention. In any case, such theories are only schemes for graphically presenting a conception in philosophy and psychology, being indicators both of the direction from which new light is streaming in and also of the prevalent subject of thought for the individual.

Concluding our review of the theories found among the German idealists for this period, we next meet with ARTHUR SCHOPENHAUER,* whose doctrine that will is the materia prima of the universe has, surprisingly, given little place to the fact of attention. He considers attending as an activity on the occasion of a sensation, and recalls the idea of Reid in his notion that sensations provoke attention, not to themselves, but towards their causes in the outer world, that is, to the so-called objectified ideas. It is remarkable into what various fields the German theories have led us, and what ingenious conceptions the Teutonic mind has given us. Grasping all from Kant to Schopenhauer in one view, we have attention as a faculty, the procession of the ego, the momenta of the notion, the manifest in the strife of sensations, the unity of a capacity with an impulse, and the fixation of objectified ideas.

Our chapter has now taken us over two centuries of time, from the close of the first quarter of the seventeenth, to the close of the same quarter in the nineteenth century. The absence of discussions on attention by many on the one hand, and the little reference to it by many more on the other hand, all indicate that the subject is still considered of minor importance, and that it has not yet assumed a distinct place among classified psychical phenomena. Almost all the conceptions on attention for this period are advanced or extensively discussed by the four men, Wolff, Bonnet, Stewart, and Herbart. Let us briefly summarize the notions prevailing in this period.

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* *The World as Will,* Vol. II, chap. III.

The physiological side is but little developed. Here, attention is said to be distracted by stimulation of disparate organs; it depends upon the harmony of the impulse with the previous impulse; it is caused almost if not altogether by sense impulses which are effectual, in their turn, only on a certain degree or number of the stimuli; it is a process easier in the fibers connected with images than in those connected with thought; it is a directing of the organs or a motor action; and as to effects, it fatigues the nerves and muscles, prolongs the duration of the impulse, is increased by practice, and adds efficiency to the organs.

The psychical side is largely discussed. Here, attention is considered as not necessary, as only partially so, or as essential to consciousness; it is simply the stronger sensation; it is dependent upon sensations, and, for the most part, upon a contrast of these, and upon the novel; it is either a sensory or a motor feeling; it is either important or chief in memory; it has the two forms, observation and reflection; it is a narrowing down of consciousness to a less number of objects; it is a faculty, a power, a state, or a fixating of something by the mind; and, as to effects, it develops dormant impulses, differentiates men from animals and the higher from the lower faculties, distinguishes mankind from each other in their skill and ability, is the first step in knowledge, measures the power of the mind, differentiates subject from object and leads from the singular to the universal, can be given to only one object at once or, as others say, to several, and it requires time. Further, it is directed more to sense than to ideas; in one view it has increased intensity with a greater number of similar impulses, in another view it has decreased intensity with the greater number; it is attracted to the stronger stimulus, and more to impulses from similar than from disparate organs; it gives feeling and is measured by it, while it depends both in itself and in its degree upon the feelings aroused; it is given to the objects and not to the sensations; and, finally, it is active and voluntary. Many of these conclusions are only apparently contradictory, when examined in the light of the author's theory.

We have reached, historically, the following important points: That attention is physiologically a motor act, and psychically a feeling of activity; that it is excited physiologically by impulse and psychically by images, feelings and ideas; and that it is determined physiologically by the sensorium, and psychically by the interest and feelings. For the physiological part, nearly all the conclusions are due to Hartley and Bonnet.

To the above must be added the valuable ideas that attention requires a threshold in some degree of stimulation, has a physiological effect in fatigue, is a narrowing down of consciousness, is the first step in intelligence differentiating mankind in their ability, and requires time for its operations. The highest number of objects able to be attended at the same instant has become limited to six.

CHAPTER III.

PHILOSOPHICAL THEORIES OF ATTENTION FROM FECHNER TO THE PRESENT.

We use the term philosophical theories to designate the ideas of a class of men, whether specialists or not, who have written on the subject of attention and who may be broadly distinguished from physiologists and from those conducting experimental inquiries in psychology. It will be seen in the end that these theories are founded mainly upon the results of those carrying on investigations. Let us now trace the notions concerning attention in these latter days.

We begin with the French writers, mostly of the eclectic school, and antedate the time of Fechner by brief references to THUROT and ROYER-COLLARD. The former* regards attention as active and as a manifestation of will, while it is either cause or consequence of feelings. This latter idea refers to a larger field of the whole subject wherein feelings both precede and follow attention. Royer-Collard opposes Condillac and Herbart, emphasizes the activity in attention, teaches that it is voluntary only, and with Laromiguiére accounts it the basis of all knowledge.

A more zealous discussion is carried on by VICTOR COUSIN,† the industrious pupil of Royer-Collard and the great French opponent of the sensational school.

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* *De l'Entendement*, Tom. I, 125-6, et Tom. II, 6-10.

† *Philosophie Sensualiste*, lecture III; *Premier Essais*, p. 297 suiv.; *Fragments Philosophiques*, V, 341-380.

Dealing almost exclusively with the subjective phase of attention, he differentiates it on the one hand from sensations, asserting that it is active, undetermined from without and voluntary; while on the other hand it is the first step towards all intelligence, one for which there can be no substitute and which must take place before perception, comparison and the higher acts. He dwells at great length upon the first of the above distinctions. What others have called involuntary attention he classes under sensation. In attending, he says, the mind is both subject and cause, and attention is solicited; in sensation the mind is subject but not cause, and the experience is imposed upon us; and, further, neither does sensation produce attention nor the latter beget the former. He points out that attention is not at all an intellectual act, and only prepares for but takes no part in perception. His points are very metaphysical, he omits the great fields of the emotions, while his conclusion is, that attention is "pure act of will" directed towards sensations for purposes of intelligence, in which end it is the mind's initial step.

Cousin's disciple, the brilliant THÉODORE S. JOUFFROY,* takes up the fact that we have many impulses when we have no perceptions, as when we look at objects yet see nothing, and from this he forms a novel theory of attention. Using the term "organism" for body and the word "personality" for mind, he advocates a system of dualism. Teaching that there are "faculties" as capacities both of the organism and of the personality, he limits those of the mind to a few, of which thinking is one with its two applications, perception and consciousness; and each of these

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***Mélanges Philosophiques*, 371-386; *Des Facultés*, leçon v.

two fields in thinking have several common forms or phases, two of which are attention and reflection. The two possible sources for facts in perception and in consciousness are impulses from without and inward activities, while attention has to do only with the former, so that it is limited to acts of observation alone. Here Jouffroy follows Kant and differs from Malebranche and Reid. Further, he says, attention is controlled by the will and is applied for the perception of a particular sensation in the personality, while in doing this it is made to accomplish two things in the organism, namely to direct and to concentrate the bodily powers; and finally, he says, without attention we would be "the plaything of this eternal flux of phenomena in which we are plunged."

In this system, the phases of mind are not distinguished in the usual way, all thinking as well as all attention is subordinated to a conscious will, the subject of emotions is omitted, and the view of attention is the opposite of that of Cousin as regards its being an intellectual act. Attention is regarded as a purposeful act for knowledge, whereby the impulses from the body become the property of the ego.

The theory of C. RENOUVIER* is very unlike that of any of the preceding French thinkers. Taking up the old division of observation and reflection, denying the existence of faculties, approaching closely to the notion that the whole mind works only in one way at one time, he magnifies the effects of feelings, and thus supplements the omissions of Cousin and Jouffroy. Feeling is first, he asserts, and at the bottom of attention; however, as emotions are passive, effort is required to get out of this state, and this effort is the

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***Psychologie Rationnelle*, Tom. I, ch. II.

reaction of the whole of the acquired feelings upon the particular feeling, that is, it is the energizing or the will because of interest. Feeling and effort give attention, a compound affair which our author curiously calls a "presentation joined with a given presentation to the mind"; and in the same way his definition of reflection as "a consciousness of consciousness through will" is equally involved. He prefers the terms "attentive consciousness" and "attentive intellect," to the word attention, as indicating a stage in any mental process rather than the working of a faculty. His idea in brief is: attention is the operation of the feeling in conjunction with the will for the act of knowing; he means, if he does not say, that it is the composite experience in consciousness from both sensory and motor impulses.

We close our review of the French eclectic philosophers by a reference to A. GARNIER,* who agrees with Jouffroy and Kant that attention is an act of observation only. He uses the term "faculty" despite the protests of Renouvier, regards all attention as voluntary, and prefers the statement that attention is "intervention of the will" in the processes of knowledge.

It is noticeable that the spirit common to all the French writers here quoted on the subject of attention is that of opposition to the sensational school, and this is manifest in the one doctrine on which all agree, that attention is not a product of sensation but the beginning of intellectual activities.

We next trace the theories of those who, living in various lands, have been influenced by the thoughts of

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* *Facultés*, Tom. I, liv. 5, 348–356.

Kant. First in this list are the German writers of recent times.

RUDOLFF A. LOTZE* treats of attention from a new standpoint differing, in his theory, from all who precede him. Attention, he teaches, is neither greater or more concentrated activity as taught by Leibnitz, nor is it greater strength of idea or of sensation as Herbart conceived; but if neither of these, what then is it? He replies that it is simply an ordinary activity of the mind which has been hindered from acting in any direction because of various difficulties, but now comes to be an activity observed through the removal of the hindrances and comparable to kinetic energy. Intensity of impulse is no factor, and attention is not at all an outcome of the struggling sensations in the mind. As to the hindrances, these are many and as follows: the multitude and the rapidity of the impulses, the poor condition of the body especially of the nervous system, the interests and prejudices developed in experience, and the confusion of sensations, images and ideas in consciousness. Further than this, attention is a relating activity. It discovers references, comparisons and contrasts, and has as its object both the single sensations and ideas, and the mutual relations of these as well. In this enlarged field, attention is hindered by intensity of stimulus through preventing the possibility of comparison.

The direction of attention, he teaches, is always towards the idea which possesses interest for the person or towards the sensation which gives such an idea, but in cases where these afford diversified and divided interests the direction is determined by that idea or sensation to which the strongest interest is attached.

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* *Philosophy*, books II and III.

The interest is analyzed into two factors by our author, first, the final feeling always called up by the idea, and second, the varying importance of this idea and its feeling in its relation to our state at the time. There can thus be no positive calculation of the direction of our attention owing to the variable factor in the interest which decides that direction. Finally, he says, the slightest stimuli secure attention when they are connected with the course of our thoughts and wishes, as is seen in touch impulses when we are observing dermal impressions; and each act of attention may itself be observable, thus enriching experience with a new object for consciousness and thought. In brief the following is Lotze's theory: attention is a comparing and relating act of mind, it is always exerted if not always effectual, its direction is controlled exclusively by interest, and itself may become object of attention and thought.

J. H. VON KIRCHMANN* regards attention as one of the active processes in knowing. He deplores the use of the term "state" in describing it, he uses the word "content" to indicate that which the mind gets out of sensation, and he opposes to Herbart's view the objection that that view would admit of endless series of presentations sinking below and rising above the threshold of consciousness, while also confusing and even making impossible the process of knowing. His conception is best shown by his accounts of some of its effects. One effect sometimes attributed to the time given for a presentation, he asserts, is to make the mind more possessed of the "content" and at the same time to make the mind forget itself; another effect, he continues, is the speedier possession of the

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* *Philosophie des Wissens*, Bd. I, cap. VII, 3, und IX, 3.

"content" by the mind; still another, and called by the associationalists the concurrence of sensations, is the joining of one presentation to another and the welding of them together. In all these operations, attention gives a great advantage in the rapid appropriation and use of the "content," while there is this disadvantage that it hinders a possible large number of presentations at once in consciousness. He gives a very interesting explication of expectant attention. By expectation a presentation is imaged in the mind in advance and thus all other presentations are excluded, so that the first stimulation of the sense by the expected object results in the immediate perception of that object.

Speaking of the causes and the concomitants of attention, he mentions the stimuli, feelings and will, and asserts that these all conspire together, in attending, to bring the impulse above the threshold. Referring to the novel, he contends that the new alone cannot excite attention when no feelings aid it in the mind; and touching on the control of mental phases, he says attention is the only means by which the mind can affect its own states. As to other bearings of the subject, he takes up ideas like those advanced by Bonnet and Brown, and teaches that there is only a limited psychical capacity of attention, so that consequently the "content" and the intensity of the presentation are inversely as the number of simultaneous presentations. Further, the will cannot increase the capacity to attend, as some think; for, he says, that capacity depends upon the due alternation of activity and cessation of attention. Attention, he teaches, is strongest in the morning and weakest in the evening, while diseases, drinks and many physical conditions affect it.

He also very well explains the old question of Quintilian and Wolff about apparently attending many operations at once: when one is familiar with a subject or with a couple of them, he may pay attention to one or several while also carrying on an entirely different matter, and for the simple reason that the first subjects do not require much of the power of attention; the same man could, however, attend only one new subject or difficult matter at once, and thus Stewart's idea of a rapid and discrete attention to several objects in succession, as if attending them all at once, is an impossibility whether those objects be new or old. To summarize Kirchmann's chief ideas: attention is an activity of the mind on feeling and on impulse, it appropriates the impulse, it joins the sensations, it facilitates perception in expectancy, it affects the mind itself and it can be divided among several familiar objects at once.

G. F. **Pfisterer*** regards attention as exclusively a psychical act. He teaches that a special sensation, through personal interest, is occasion for limitation of consciousness and attention; that in the freedom of attention to select one or many impulses, under interest, it inhibits or neglects all other impulses from external stimuli; and that the moment the attention is directed to a second object there is no further consciousness of the preceding. The interest referred to is either an attraction in the nature of the impulse or its tendency to incite a pleasant feeling. Attention is thus a direction of the mind's activity to one or to a number of impulses under the law of greatest pleasure, and also an inhibition of all other impulses.

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* *Psychologie*, sec. 6.

With Pfisterer is completed our review of the German branch of Kantians, and it has been noted that the views are predominantly from the psychical side, with an adherence to Leibnitz's idea that attention is a limiting of the field of consciousness. Of the same school, two Scottish writers have something to say on the matter of attention.

It is in his analysis and criticisms of Reid, Stewart and Brown that WM. HAMILTON* makes his most important observations on our subject, agreeing with the first two that sensation and attention are two very different things, but taking grounds against their doctrine that consciousness precedes all attention. With Kirchmann he assumes a certain intensity at the command of consciousness in the act of attention, and this total may be distributed over one, a few or many objects at once, with a maximum intensity of sensation in the case of a single object. He agrees with Stewart that attention heightens our consciousness of sensations and asserts that it even "doubles the efficiencies" of our mental acts. With Helvetius he teaches that attention lies at the bottom of the difference between the ordinary classes of mankind, and the skilful and gifted. His doctrine does not seem to have been completely formed, for he at one time calls attention an act of desire and at another time an act of will, though the connection he would make is apparent in the control of will by desire; and his notions, that there can be no consciousness of an impulse without attention, while attention is concentrated consciousness, appear a perpetual circle; but this rather shows the intimate and inseparable connection between consciousness and attention. Acutely for his time, he finds a variety of acts of attention and classes them under the three heads: the automatic, taking place, he says, when the organs are open and the mind is not preoccupied; the involuntary, determined by irresistible desire; and the voluntary, deliberately determined. In Hamilton's own words, "attention is consciousness voluntarily concentrated"; or, to cover all he teaches, attention is psychical, it is separate from sensation, it is necessary to consciousness, it is either mental accompaniment of a reflex, forced or voluntary, it has an intensity inversely as the number of objects, and its use distinguishes men from one another in ability.

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* *Metaphysics*, lectures XIII and XIV.

Robert Blakey* opposes the idea of a faculty of attention, regards it as one of the powers of the mind, and teaches that it is capable of being exercised along with any other mental power.

In England we trace the Kantian stream in two writers influenced in part from Germany and in part indirectly through Hamilton.

H. L. **Mansel**† opposes Stewart and contends for the necessity of attention to consciousness. In the unconscious state, he teaches, the phenomena is one thing, it is a felt impulse; in the conscious state the phenomena is another thing, it is a distinguished impulse: before attention there is a general consciousness that some object has affected the person, but there can be no knowledge of what that object is, attention transfers the impulse into consciousness. For the term "felt" impulse our author uses also the words "latent modifications of mind," and in this he recalls Leibnitz's terms, "obscure representations," for in his theory he uses the great German's doctrine of perception and apperception. He further states that attention is both active and passive: the latter because impulse gives a feeling of solicitation, the former because of the feeling of effort which is also the voluntary part. With Mansel, attention is both active and passive, it is voluntary, and it is vital to consciousness as well as essential to knowledge of the object.

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* *Philosophy of Mind*, Part II, chaps. I and II.

† *Metaphysics*.

J. D. MORRELL'S* teaching on the subject is that attention is a discrimination. He regards it as a psychical act in perception on the first change of state in sensations, but, he says, no continuance of similar sensations of equal intensity can possibly attract attention.

We shall now follow the Kantian influence in the United States and shall here find, under this reference, the two writers Hickok and Bascom.

In his classification of psychological phenomena, LAURENS P. HICKOK† gives a clear and succinct statement of the position and work of attention, in a theory based on introspection. As James Mill to Hartley, as Condillac to Locke, and as Wolff to Leibnitz, so is Hickok to Kant in the development of the master's view concerning attention. The basis of his theory has the following for its parts: the intellect has three forms of activity, namely sense, understanding and reason; perception is the apprehension in the understanding of the object given in impulse in the sense,

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**Outlines of Mental Philosophy*, Part II, chaps. I and II.

†*Empirical Psychology*, pp. 113–126, "The sense"; *Rational Psychology*, pp. 81–104, "Sense in its subjective idea."

through the "content" of the sensation; the impulse and the sensation are either of external or of internal origin; the operations in an act of perception are called "intellectual agents"; and finally, the various mental acts are regarded as "faculties." With these explanations in mind the place assigned to attention is plain: it is an operation wholly in the domain of the intellect and occurring between the impulse and the perception of the object. Before the exercise of attention, however, there is the "intellectual agent" observation which defines the sensations, determining the external as to its kind in origin from organ, and also as to its variety and its individuality, from all others; while at the same time distinguishing the internal as to its kind in thought, feeling or will, and as to its variety and specialty. The result of observation is to give *quality* only and described as above, or by the terms reality, particularity and peculiarity; but with this operation alone there would be no perception. Attention now comes in as the activity whose work is to construct and to give form: it goes over all parts presented as from without and gives one space, it goes over all instants presented and gives one time, and so likewise it goes over all the degrees presented from the threshold to the actual and gives one intensity. The result of attention is to give *quantity* only and as just described, or defined in our author's language as extensity, intensity, and protensity. An example of the constructing power is referred to in the mental movements in forming a geometrical figure, where attention uses imagination to construct general space and time.

In his use of the word "content" he follows Lotze as well as Kant; in distinguishing observation from attention but including reflection in the latter, his theory is unique and differs from that of all others; while in making attention a constructive agent he expounds the Critique. To sum up, Hickok regards attention as an act of the intellect, and one which constructs the qualities gained by observation from sensations into an object of consciousness by furnishing the forms of space, time and degree. It is worthy of note that attention is here given more amplitude than in any other system, and that, from the side of introspection, there is given the most systematic and rational theory of attention to be found in the whole course of our historical review.

One of Hickok's pupils is JOHN BASCOM,* who applies attention only to the states of mind recalled in memory. He contends that these states, such as perception, thought and feeling, are immediate in the mind and following the bodily impulses, while all that we can possibly do is to attend to these states. Greatly limiting the application of attention, he does not say much on the subject, nor does he say that little with any definiteness.

Our review of the notions of the Kantians from Lotze to Bascom has acquainted us with as interesting a variety of theories as the simply retrospective view can give us. These theories variously divide the functions of attention between intellect and will, from Hamilton's "voluntary concentration of consciousness" to Lotze's "relating activity," Kirchmann's "unifying of content," and Hickok's "constructing agency."

It is most appropriate to include here the views of two Americans whom it is not convenient to class elsewhere.

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* *Psychology*, pp. 258-9.

JOHN MILLER* calls attention the will in thinking under the guidance of the strongest emotion. In reflection and memory this voluntary attention consciously takes place by calling up other ideas through laws of emotion and of association, but chiefly by ruling out all ideas not wanted and by retaining the thought which brings up the required train of ideas.

JOSEPH HAVEN† also regards attention as a voluntary power of the mind whose strong direction in one course excludes all objects out of consciousness from other directions, and this is done by arresting and averting all foreign thoughts so that the activity can be devoted solely to the object in view. He makes the curious statement that attention is sometimes the sole occupation of the mind, he follows Malebranche in calling its two forms observation and reflection, and, like Laromiguière, he considers attention the beginning of all mental activity.

We observe in the views of Miller and Haven the notion that attention is an exercise of the will, as also the other theory that it is an inhibition; the latter idea has been presented as early as the time of Augustine, and is now soon to occupy a prominent place in the conceptions of physiologists and from thence to be transferred into the notions of psychologists.

The theory of Hartley has already been examined.

It is now appropriate to look into those of the later associational psychologists. ALEXANDER BAIN'S‡ view is from the standpoint of the changes and the transitions of impulses. If the impressions from the organs of sense are continuous and unvarying, there is no attention, he says; while this is aroused in proportion to the extent and the abruptness of these variations. He calls attention a "state," as did De Tracy, and makes it to depend largely upon the body and its "nervous vigor"; while its direction depends upon the preöccupation of the mind, or more correctly, he asserts, upon the feelings. These feelings are pleasing, neutral, or painful; the pleasant arouse and hold voluntary attention to the impulse or the object signified, the painful do this against volition, and the neutral secure attention according to their intensity.

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* *Science of Perception*, pp. 69-72.

† *Mental Philosophy*, Div. I, chap. II.

‡ *Emotions*, chap. I, secs. 19, 20; *Will*, chap. IV, sec. 6; *Intellect*, chap. I, secs. 5 and 52.

Though he reverses in the second edition of his works some statements made in the first, Bain seems still to account attention, feeling, and consciousness as very much the same, and cannot extricate himself from this idea: in the first edition he uses the terms "feeling" and "consciousness" as synonymous, while in the second he so uses "attention" and "feeling." Further, also, he makes the genesis of each to be the same and the same laws to be applicable to all; change of impressions is necessary to each, without change we can have neither, and the measure and degree of change is the measure and degree of each. In brief, Bain emphasizes the effects of changing impulses on attention, points out the intimate connection between attention, feeling and consciousness, and calls the first, as well as each of the others, a state of mind.

There is little to be said of HERBERT SPENCER,* who makes all mental action to be "the continuous disintegration and integration of states of consciousness," and who presumably regards attention as one of these changing states dependent upon other states called feelings, and concerned in deriving quality and degree from the reports of sense impulses. What is said by our author is not explicit on the subject in hand.

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* *Psychology.*

It is noteworthy that the associational school generally consider attention to be a state of mind.

We notice next the theory of one of the materialistic school and also of two who are especially opposed to materialism, and whom we have not been able to class along with others in the divisions laid down in our plan.

The first is **Czolbe**.* He assumes a "world soul" as existing everywhere, a materialized psychical substance, elastic, continuous and limitless. Further, this substance feels, he says, and has sensations which are all unconscious and passive, but, when it is limited to a body and its organs, a motion occurs in the impulses, the sensations become individual and there is consciousness as the result. So much for the foundation of the theory.

Consciousness, he teaches, is the indispensable condition of attention, for the ego and the non-ego are first united in the sensation, and then attention separates and sets them apart, deriving the latter from observation of the external factor and the former through self-observation. He calls one a knowledge of the world, the other a knowledge of self, and reproduces the theory of J. G. Fichte, transforming it pretendedly from idealism to materialism.

Of more interest is his view of what attention is. It is either casual or voluntary; the former he does not describe. Voluntary attention is, on the one hand, the controlling of the organs and the modifying or increasing of the impulse in keeping with an end in view in the organism; on the other hand, it is the doctrine of the brain centers, in accordance with the laws of the association of fibers and cells, so as to modify or increase the internal impulse in harmony with the same aim.

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* *Extensionale Erkenntniss Theorie*, secs. 1–4 und 9.

As has been remarked, all feelings are sensations in this theory, and so impulse and emotion are herein confounded; the author has attempted to make attention wholly a motion of organs and nerves, but has been unable to do so without his supposition of the "world soul" as a psychical factor; and finally, he makes attention both physiological as the adjustment of organs, fibers and central cells, and psychical as adjustment in consciousness. Given sensibility and an organism, the materialists may be said to state through Czolbe that attention is a conscious act of the organism whereby it distinguishes outward and inward impressions from each other, the former as foreign, the latter as its own.

SERBATI ROSMINI,* though utterly repudiating any form of materialism, apparently goes as far as Czolbe on the physiological side of attention, for he teaches the doctrine of panpsychism. His theory is complicated, and is based on the notion that we perceive the objects themselves by taking them up into our organs. He is here a realist, and, when fully construed, he means that the impressions on the organs and the impulses in the fibers are those objects, and these he calls "terms," realities variously described by him as feelings and impulses, and these are under certain laws of matter whereby they both move and perdure. But panpsychist as he is, he cannot avoid setting over against impulses, as after all physiological, a psychological factor called the "rational principle," which has its own mode of action, in general mental and in specific intellectual laws. To further understand Rosmini, it must be noted that the sensation is not perceived in the general mind, but only in the intellect, and that it is a peculiar modification of ourselves.

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* *Philosophy*, secs. 74–85; *Psychology*, chaps. XXI–XXVIII.

Attention now comes in as bridging the chasm between impulse and intelligence wherein the impulses, in accordance with their nature and laws, excite the intellect to active operation. He once wavers from this position however and calls attention "rather an activity of the will itself," and in consonance with this he then makes all attention to be voluntary. By attention we perceive external bodies, he says, through general concentration of the mind upon the impulses; beyond this, we distinguish ourselves, the sensation and the external object, each of these three from one another, and this is done by what he calls "intellectual attention," wherein the process of understanding goes on with the process of concentration. At this point he makes issue with all Aristotelians and asserts an intellectual attention to two or more objects at once; while, in his discussion of this feature, he advances the idea that comparison is a third object, the difference of two attended objects, which third may be also something more or less than this difference. He further contends for the great influence of predominant feelings on attention, and makes these to be incentives to reasoning as follows: remembered impulses and sensations, technically called "needs," conjoin with the objects in intellectual attention and stimulate that attention to a new series, which yielding comparisons and other mental products gives logical processes as results.

With Rosmini, attention is a many-sided activity. It is entirely voluntary on impulse being given; and it is either general, discovering external objects, or it is of various intellectual kinds, giving (1) object, sensation and person, (2) comparison, and (3) reasoning. He teaches that there is no attention without external stimulus. He regards it with Lotze as preëminently a discriminating and comparing activity, while like Hegel he maintains that this act alone furnishes subject and object.

With less of the mystical in his terms and theory than in those of Rosmini, HERMANN ULRICI* treats of mental action from material, physiological and psychological standpoints, does so with vigor, and deals both with rational and empirical views of the subject. Mind, he says, is something different from organism. The whole intellect is a distinguishing power, and herein attention is vital for all such acts. His chief doctrine briefly condensed is this: activity is the one great thing in the universe, one of its forms is the physical motions and another is the mental phases. From this view he criticizes Herbart's theory of attention as the activity of sensations alone and urges the need of intellectual activity as well, while he replies to certain opponents that stimulation and impulse do not of themselves give attention. The mind is the only source and continuation of attention, he says, and the latter operates on the impulses which are hidden in the unconscious domain of the mind; that is, in the general feelings of the body throughout the whole nervous system. Attention brings the particular feeling up for consciousness, and the degree of the sensation depends upon the degree of the attention, so that in this way attention has the unusual power of making strong sensations from weak impulses. Ulrici emphasizes the psychical side and regards attention as exclusively an activity of intelligence, intensifying and distinguishing the impulses for further operations of the mind.

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* *Leib und Seele*, Theil I, sec. 246, etc.; Theil II, sec. 27, etc.

Of the three writers just mentioned, the first makes attention more an adjustment in the organism, while his two critics make it more an adjustment apparent in consciousness.

We give brief space here to a writer on pedagogics. Nearly all these writers very appropriately refer at length to attention, but their statements are generally of a practical rather than of a philosophical nature, and so do not deal with attention in itself.

G. COMPAYRE* more particularly enters into theories on the subject. He considers attention a free psychical activity which ends in intelligence; it is an inward effort—"the liberty of the spirit," he says, following the object chosen, as it is also a general mode of all intellectual operations. In these views are met reflections of those of Malebranche and of Laromiguiére, but there is a total silence concerning great physiological factors and conditions.

It remains yet, under the head of pure theorists, to trace out the ideas of the Hegelians on our subject. It will be interesting to find here a variety of conceptions drawn from various sources, all of which we now group together.

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* *Lectures.*

In the "Philosophy of the Unconscious," EDOUARD VON HARTMANN* adopts and modifies various theories of attention. He exceeds many psychologists in considering attention to be a motor innervation; he transfers Hamilton's theory of a divided attention to many objects or a concentration of it upon one, from the region of the conscious to that of the nervous system; he explains Bonnet's and Stewart's heightening of the impulses in attention by the effects of a centrifugal nerve current to the peripheral or other organs; he agrees with Malebranche and Bain that attention is sharpened by interest, but looks upon that interest as greater, peripheral going, nerve currents; and finally, like Lotze, he teaches that attention constantly gives new phenomena in experience, but does this by movements in the scalp and in the organs, produced through motor innervation.

His whole theory lies in the conception that attention is a centrifugal nervous current through central innervation, and occasioned by the operations either of the imagination or of the sense stimuli. This current may or may not flow to the peripheries, but when it does it affects organ and impulse. Attention, he classifies, may be voluntary or involuntary: the latter is the result of reflex action, and expresses the astonishment of the self on something being thrust upon it from without; the former is the innervation of what organ we please, to secure what sensation we please. The fact that attention is often not given to a stimulus is due to the preöccupation of the cerebrum in other

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Philosophy of the Unconscious, Vol. I, chaps. v and vii; Vol. II, pp. 105–113, 131–2 and 174–5.

directions so that it cannot react on the given impression.

It is specially in accord with his system to teach that there is a general attending throughout the whole nervous system: in concentrated attention, this current and strain lie along certain fibers and nerves at the expense of all the rest. He teaches also that both the power of concentration and the quantity of attention differ at different ages and for different people, according to the state of the nervous system. Finally, he says, all attention is either conscious or unconscious, and this is a division from the consideration that all involuntary attention is unconscious, as seen for example in the sudden closing of the eyelids in case of danger.

Hartmann's theory in brief teaches, that attention is a motor nervous impulse; that it is voluntary and conscious, or involuntary and unconscious; that it strengthens and even originates impulses; and that it enriches sensation, perception, imagination and memory. It is the physiological view. It has been called a materialistic conception of attention, but it is based on the notion that matter itself is only a form of will and idea. The criticism is just, however, in that his system discriminates perception, thought and consciousness, from impulse and nerve, while it does not do so in the case of attention.

It is not surprising that I. H. FICHTE* should posit attention to be the manifestation of the ego to itself. He regards will as the fundamental operation of the ego and the basis for all consciousness and attention, so that by its own will any mind attends to and is conscious of the "contents" of an impulse. Interest, he says, draws the mind to its "content" in a presentation, and attention lights up the object more clearly. Similarly to Hegel and the elder Fichte, he urges that there is no consciousness without attention, and that in that case both object and subject are the same.

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* *Psychologie*, sec. 192, etc.

Omitting the philosophic idealism in the theory of J. K. F. ROSENKRANTZ,* we reduce his statements to general terms. The mind, he says, is self-excited, which is a process of getting ready; before this process there is no experience and can be none for the particular case; in getting ready, the mind makes itself receptive to an impulse; and after attaining this receptive condition, the mind distinguishes and takes in the impulse, making it a part of its operations. Further, this activity manifested in readiness and in reception of impulse is directed by intelligence, but controlled in the line of its direction by the total feelings resulting from experience. He has little or nothing to say about the intensity of the stimulus, while, he says, not intensity, but inner feelings determine the object of attention. He goes far beyond Laromiguiére, but agrees with Hartmann, that all experience and all consciousness is founded on attention.

To summarize Rosenkrantz's theory: attention is a wholly self-active capacity of the mind, is formally free and voluntary, is entirely determined in the mind, is the first stage in the mind's self-objectification, and is an intelligent activity preparing, looking out for and taking in, such impulses as the mind chooses to receive. The view is extreme as regards the supremacy of the individual mind above all stimuli.

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[*] *Psychologie*, sec. 332, etc.; *Die Pädagogik als System*, secs. 178–180.

From the same point of the mind's activity, J. E. **Erdmann**[*] discusses our subject. He says there are two limits in our knowledge, that which is well known, technically that incorporated within our spirit; and that which is strange to our minds. Now it is between these limits that there lies the great field of the not known, and in this field there constantly goes on a process of bringing the unknown over into the known; and this field is where our mind is constantly stimulated because of the interest developed in experience. As long as there is simply the organic impulse, he teaches, there is yet no incorporation of the unknown object into the mind; for this latter end there must be more than the sense of there being an object, "perception," he calls it, and here is where attention does its work, causing the first coming of the object into the mind, its earliest apprehension in the consciousness: particularly resembling Kirchmann's in the idea of "appropriating the impulse." This view makes attention the first step of the active mind in conscious knowledge.

We conclude here with a reference to W. F. **Harris**,[†] who has done more than his modest article on pedagogics would indicate, for he has elucidated a complete theory. Like Wolff, he makes attention the point of departure of the man from the animal, explaining that it is chiefly the higher form of attention, its manifestation in reflection and in abstraction, which makes the great difference. He says impulse is a sense perception, while attention is the point where will controls the mind for intellectual ends, the point where sense perception may be made to be remembered. Further, he says, the mind is ever active and ascends from impulse through one form or another up to completed idea, and in this round of ascent attention is the lowest and the first.

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[*] *Psychologische Briefe*, secs. 276–289.

[†] *Journal of Speculative Philosophy*, 1880, pp. 231–3.

On completing the list of the Hegelians we remark that there is no full agreement among them. The conceptions include one physiological theory, the idea that attention is the distinguishing of the self from the not-self, and that attention is the only means by which the mind receives impressions; while there are two points of marked harmony of opinion among all, namely, the necessity of original attention for all self-consciousness and intelligence, and also that attention is an activity on the part of the mind.

We shall now consider the various views of a number of specialists as investigators in different fields of philosophy and psychology, whose work scarcely permits their being classed either as physiologists or as men engaged in experimental efforts. Their opinions form the connecting link between the introspective and the experimental methods of dealing with our subject. The class is one necessarily miscellaneous and the theories are often incomplete and fragmentary.

We meet, first, with three interesting names in France. BOISMENT* considers attention to be an active, psychical power. It participates in calling up the millions of registered impulses as signs of thoughts, and especially is it the initial activity in association as well as in forming and calling up trains of thought. He further describes its activity as of an inhibitory kind, extinguishing the images and visions formed from the registered impulses. Boisment does not present any theory, but only discusses attention in its aspects connected with abnormal conditions of the mind.

**Illusions*, pp. 362–7.

PROSPER DESPINE* regards mind as a perpetual psychical motion, and defines attention as an arrest of this flow, for a time, upon a determined object. He does not give his notion as to what determines the object. He subdivides this arrest into observation and reflection as did Malebranche: reflection itself, he teaches, is a forced preöccupation of the mind, inasmuch as the attention is attracted to some object in memory or imagination through the control of certain instinctive elements, hence, he concludes, all reflective attention is involuntary, a doctrine now the very opposite of that long before advocated both by Aristotle and Plato. He adds the pertinent remark that inability to fix attention is the mark of a feeble intellect, and that in such a case there is a tendency to great loquacity.

H. TAINE† does not take up our subject in any systematic way, but treats of it in its relations to sensations and memory. He regards it as an act of will, but as either voluntary or involuntary in its forms. In one view of it he advances an opinion like that of Herbart, that both kinds of attention are caused by sensations, images and ideas in their mutual contentions one with another; in another view of it he applies Darwin's doctrine of the "struggle for existence," teaching that the stronger mental form, whatever it may be, overcomes and drives out the weaker, and thus attention prevails in that direction. In any particular case, he teaches, the root of attention lies in the first sensation, wherein the chief thing is our feeling of surprise or of contrast because of something new, and because of our consequent curiosity concerning it; at the same time, if strong and continued attention be given these first sensations on the first stimulus of its kind, then the images and thoughts recurring on and after those sensations are also stronger and ever secure attention in the mind. He vacillates, however, between the two theories, namely whether images and ideas cause attention, or whether attention causes images and ideas; what has been just given as to the origin of attention supports the former view, while his remedy for obscuring sensations of bodily pain by absorption in mathematics, etc., illustrates the control of mental images by attention. This whole matter, however, well shows how all our psychical existence and all our mental experience is intimately connected with what we call each single mental act. Taine correctly points out that stronger sensation is but a relative term referring to the person stimulated, and that it is judged to be so by its effect on his attention and by the effect of his attention on it in return.

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* *Psychologie Naturelle*, Tom. I, pp. 16–20.

† *On Intelligence*, Pt. I, bk. II, chap. II, pp. 78–82.

If the theories of the French here referred to bear more in the direction of neurology and experiment, those of the following Americans, with one exception, tend more in the direction of introspection. If the theories of the former have been incomplete, and necessarily so in an advancing science, those of the latter will appear more full. We bring together the views of four American writers under this head.

Noah Porter* often uses the words "spontaneous interest" in objects for the word attention; while he indicates the sources of this interest as the two great unexplained fields, "the ordinances of nature and the constitution of man." In a fuller way he describes attention as the mind's activities in any direction, which "activity in direction" appears of greater or less degree according to the condition of the mind. The object of this direction, and hence the direction itself, is determined, he says, partly by its mutual relation to other objects and partly in the susceptibilities which have been developed in the person. We are here very far from any Kantian idea of a faculty of attention, but have the conception of an application of the whole mind or of as much of it as may be necessary in a particular case; and we have also reached the modern notion that the whole mind acts all together in any one phase of its many acts.

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* *Intellectual Powers*, secs. 69, 152 and 178–180.

Not differing much from Porter, JAMES McCOSH* also regards the whole mind as fixed in the act of attention. He looks upon will from the standpoint of evolution, and as of all grades from instinct to strong volition; while, viewing attention as an act of will, he grants to it a similar variety of grades. The mind is fixed upon its object, he says, through means of either the sense, imagination, memory or reason, and it in this way detains the object for a clear apprehension of it; while the utility of attention is illustrated by the fact that an attended object has connected with it by association a larger number of related ideas. With Laromiguière he holds the necessity of attention for knowledge; with Leibnitz he emphasizes the idea that attention is a narrowing down of consciousness to fewer objects; with Bonnet and Helvetius he points out that attention gives excellence; as Bacon had done, he makes attention of primary value in memory; and with Kirchmann he teaches that attention is fundamental in the associating of ideas by linking one to another. Strangely enough he uses the term "rejection" for what others have called the inhibiting act in recollection, and teaches that this act is something entirely different from attention. McCosh's theory in brief is: there are various grades of attention from the spontaneous to the voluntary, it is a narrowing down of consciousness to fewer objects, and it is necessary to knowledge, memory and association of ideas.

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* *Psychology,*—The motive powers; The Will, pp. 235–6 and 242–4.

As a compiler, GEO. T. LADD* presents incidentally much matter which bears on our subject, but we are most concerned with his own conclusions. He does not himself say much about it, but what he does say is clear and to the point. He divides attention into two classes compulsory and voluntary, and contends that these are each the acts of a something more than the organism alone, that is, of the mind which is not organism. The fact that attention is given, he says, requires that there should be objects attracting it, while in the case of compulsory attention these objects are "particular images," most things clearly perceived and all intense sensations. He earnestly protests against any such ideas as those of Herbart, the sensational school, or of the materialists, that attention is one-sided and sensuous alone, or that it depends only upon the stimulus and the brain centers. Ladd's teaching is: attention is an act of the person on impulses from without or on ideas from within, it is either compulsory or voluntary, and it presents an operation in the workings of the mind not produced from the sensorium alone.

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* *Physiological Psychology*, pp. 527–544.

Even more than Ladd does Wm. James* contend for the complete spiritual and psychical nature of attention. First a physiologist and then a philosopher, he points out what may be called connecting ground between physiology and psychology, and then altogether divorces the two sciences by treating of attention as preëminently belonging to the latter science. Appealing to the "new psychology" and to consciousness, he calls ideas the spiritual counterpart of nerve currents, he discriminates all mental from nerve and muscle effort, he first identifies affirmation, belief, attention and volition as acts of the same species and each the result of the surviving notion in the conflict of ideas, and then, later, particularly asserts the complete correspondence and identity of all will with all attention wherein the latter either is secured by the strongest notion or itself secures the strongest notion in the conflict of ideas. Further, his theory assumes that there are both sensory and motor operations in each of the anterior cortical centers; it assumes all that is demanded in the line of reflex and inhibitory nervous acts from the cortex, but denies the participation of each and of all these in acts of attention, asserting that sensation and ideation, will and attention, are psychical "concomitants" to the two classes of nerves and to all reflexes and inhibitions. Affirming that the physiological and the physical only show what attention does, he turns to consciousness to show what it is. Here he finds attention to be will. The voluntary effort is derived from the non-voluntary he admits, and so presumably the voluntary attention is developed from the compulsory; there is no passage of force from the idea and the will down to the nerves and to the bodily mechanism, he says, and we only know that an idea kept in mind and accompanied by a feeling of effort becomes a fact; keeping an idea in mind, he teaches, may end there or may end in bodily movements, but each is an act of attention. He would doubtless say that, in involuntary attention, there is a purposeless development of ideas in which the stronger supplants the others and secures attention; and finally, he does say there is a purposeful reflection in the midst of the conflict of ideas and this gives the facts of voluntary attention. This voluntary attention is an inhibition of some ideas and a holding on to others, this retention and inhibition forms what we call a sense of effort, and this latter differentiates all voluntary from involuntary attention. In the attention connected with observation, he teaches, the adjustment and movement of organs and muscles have their "concomitants" in the sense of effort referred to; and in this species of voluntary attention the process is more than the willing of the idea as idea, it is now the willing of idea as fact, while the manner in which the nervous and bodily mechanism conspire to make the idea to be a fact is unknown. Thus we only know how attention is given, and that its physiological accompaniments take place; at the same time he says, more explicitly, voluntarily willing an idea as fact is the same as attending it as fact. In addition to this he urges the importance of attention in connection with morals and beliefs. The only moral power we have, he teaches, is the attending a good idea in consciousness or the inhibition of an evil one;

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* *Feelings of Effort,* Mind, 1880, p. 152; *What the Will Effects,* Scribner's Magazine, Feb., 1888, p. 240, etc.

the source of a system of belief is a constant attention to one idea or to one train of ideas until it fills our mind.

In brief, James teaches that attention is wholly psychical, but corresponding to the inhibitions and innervations observed in the body, that it is involuntary in passive reflection and manifested in instinctive reflex action, and that it is voluntary in purposeful reflection and so manifested in designed organic movements. One observes in this theory the earnest attempt to harmonize Plato's doctrine of ideas and the latest physiological psychology; there is also a striking analogy between the play of ideas advanced in the theory and Herbart's play of sensations; herein we have Malebranche's attention in voluntary reflection divided into the two classes, voluntary and non-voluntary; further, Kirchmann's notion that attention to the impression fastens it in the mind is here amplified in the doctrine that retention of the idea fills the mind with it; and finally, James' theory approaches attention at first from the physiological side, and then changes and views attention itself from the standpoint of consciousness.

From this résumé of the views of certain American scholars and from their decided emphasizing of the psychical in attention, we turn next to the theories of four Englishmen who may be classed here.

E. Pick,* is of interest as a representative of those working in mneumonics, and he exhibits the influence of Herbart. Ideas, he says, are pouring into our minds in everlasting contest, the stronger suppressing the weaker, and the equal ones blending in association;

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* *Memory*, pp. 64–72.

the number of these ideas may, however, be limited by inhibitory processes which he leaves undefined. In this process, attention is a viewing of the contests or of the truces on the one hand, or it is the inhibition of additional ideas on the other; and this latter is one of the greatest aids to memory, whereby the "struggle of ideas" is limited to a very few, and these are given opportunity to be permanently fixed in the mind. This writer has simply taken the sensory and the motor operations in their counterparts in consciousness, and from them has constructed a vague theory of attention and of memory.

JAMES SULLY* summarizes the results of many observers among the experimental psychologists and then indicates his own conclusions in a number of points. Connecting the three mental processes of feeling, intellect and will, and the various nerve processes, all together in the one operation of attention, he gives prominence both to its physiological and its psychological aspects.

On the one side, he teaches, nervous processes give a vague feeling, and here begins attention in its reflex form, which, theoretically, should be as the strongest stimulus; it is indeed in proportion both to the quantity and the quality of the stimulus, is dependent on change, and is hindered by rapid, sudden or powerful impressions. On the other side, he says, the self-directing of the mind as attention is present in all mental operations; this activity is a form of will in arbitration among a variety of interests; it is directed for intellectual purposes, and, while not affecting the impulse itself, gives force and distinction of sensations by which the further operations of interpretation

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***Illusions*, pp. 21-2, 31-2; *Outlines of Psychology*, pp. 73-106.

and classification are carried on; and from this view the greater extensity of attention gives the less intensity, while the degree depends both on the sum of mental energy and the strength of stimulus. He subdivides attention into the variable and the fixed, teaching that the former depends on will alone, and the latter on will and feeling combined. In this way he distinguishes will as that which directs, from interest as that which holds.

There are here exhibited ideas antagonistic to those of Reid and Bain who taught the entire subjection of attention to feeling. We have Leibnitz's narrowing down of consciousness, while most prominent is the notion of Brown and Hamilton that the degree of attention is inversely as the number of objects attended. In brief, Sully considers attention to be, in general, mental condition of willing for intellectual work and coöperative with feeling; in particular, to be will manifested on impulse from without, or on image and idea within; also to be physiological so far as it depends on the nervous operations, and finally to be a complicated operation in its details.

In the theory of J. J. MURPHY* we have a number of physiological assumptions: the cortex is the seat of consciousness, from the lower ganglia and lower sensory centers there are "nerves of consciousness" connecting with the cortex, and from the cortex there are "nerves of will" connecting with the lower ganglia and lower motor centers. In this theory attention is the arrest of the reflex action, and the arrest is produced by the connecting "nerves of consciousness" setting in motion the "nerves of will," which latter in their turn and by their connections restrain the motors otherwise excited to action by the reflex. Attention is thus regarded as inhibited reflex action. He illustrates this by the case of the pointer dog, in which the usual reflexes of the throat and leg muscles at the sight of game are arrested and the animal is quiet and motionless. He maintains that there is a certain store of energy, subject to excitation through the sensory impulses into motor discharges, and when this is not all consumed in the discharge the remainder, sometimes the whole energy is exerted in the higher centers arousing consciousness and heightening it in the act of attention, and in this idea appears a new modification of Bonnet's theory of the nervous energies.

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* *Habit and Intelligence*, chap. xxxi.

All that this theory gives on the psychical side is the act of will in consciousness, while it also teaches that an original mental inhibition may cease through habit and so the particular psychical part become lost, though the whole of the physiological operation continues. The theory is a graphical method for presenting the anatomical and the physiological elements of attention as cortex loops from lower sensory and motor centers.

In his article on psychology, JAMES WARD* makes constant references to attention, after he has once touched upon the subject. Every reader must notice this, and the fact shows the increasing interest in this feature of the mind's activity. Like Sully and most others he differentiates feelings from sensations, and distinguishes non-voluntary from voluntary attention. With Reid he regards all attention as conditioned by feelings, but he considers these to be the pleasant in cases of voluntary attention, while for the non-voluntary they are the painful, together with those from sudden shocks and all sensory impressions. Along with this he adopts a contradictory theory similar to that of Thurot, namely that feelings both precede and follow attention, preceding the voluntary and following the non-voluntary. Differing from all other psychologists whatever he finds three irreducible facts of mind; attention, feeling and presentation: while between these three, he says, there is always a nexus. The fact that attention is one of these three, explains its prominence in his discussion. He does not clearly express the relation of motor movements to attention, but at the same time he agrees with James that they help us to realize some of the ideas by converting them into facts, while he also points out that the feeling of motor innervation is "strongly like" concentration of attention.

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* *Encyclopedia Britannica*, Vol. xx, Art. Psychology.

He regards Leibnitz's "perception" or general consciousness as a continuum or background for the unity of consciousness; in this background innumerable impressions are made in a confused way, and all things are held together in the general experience; while from these confused impressions attention differentiates and specializes each object as one of a whole: in such a view attention covers the whole of the active field of consciousness. In a way similar to Lotze's "relating activity" attention, he says, gives the subjective relation of objects, doing so even in the lower forms we call inattention. He teaches that attention by the subject implies intensity in the object, while subjective intensity is increased by voluntary attention or by increased stimulus. Further, he agrees with Kirchmann and others that attention fixes objects in association and in memory, producing this sometimes by concentration on a number of objects or events at once: and finally, this act produces the idea of subjective time through noticing the discrete and successive events. To summarize Ward's theory: attention is non-voluntary on a nervous shock and voluntary on agreeable feelings, it is one of the primary activities of the mind and coëxtensive with all consciousness of activity, it is a narrowing down of the general consciousness for the time, it is like a feeling of motor innervation, it is a chief factor in subjective intensity, it gives subjective time and other relations, and finally, it is the great factor in association and in memory.

With the summary of the views of Ward we have reached the end of our list of philosophers and of theoretical psychologists, and we now turn to a brief review of the philosophic conceptions about attention since the time of Fechner. It is hardly to be expected that we should have many physiological theories from the metaphysicians, but it is noticeable, however, that the several departments of science influence each other and we have found here such bearings of physiology upon psychology.

On the side of the organism the following are the chief conclusions of the philosophers for the last sixty years or more. Attention is partly automatic or instinctive; it is dependent on the state of the nervous system and other physical conditions, and is also based upon both the variation of impulse and the relation of these to associated impulses; it is manifested either in reflex action or in inhibition, and it is itself either reflex action and motor innervation with motion of organ and of nerve, or it is arrest of nerve impulse and inhibition of reflex action; it is an energy through the whole nervous system and with an intensity inversely as the number of simultaneous impressions; it is prevented by many impulses or by too great rapidity of the same; and finally, as regards effects, it directs and controls the organism, increases or modifies impulses, and even prevents impressions on the organism.

On the psychical side the views have been numerous, but can be collected around a few central points. Attention is an activity though with some passive features, and it is a discriminating activity; it is a voluntary activity, or it is also partly non-voluntary; it is the basis of consciousness and it is fundamental in morals and in belief; it is the reaction of feelings on any impulse or it depends on feelings; it is a sense of inhibition or of motor innervation; it may be given to several objects at once, and is also a narrowing down of consciousness to a less number of objects, or it is "apperception"; it is regarded the same as observation except by two writers; it is severally mentioned as a faculty and a state, but it is specially regarded as a relating activity, as restrained activity set free, and as a primary act of the mind; once more, it is a process in self-objectification; further, it is the basis of knowledge; and finally, with regard to its effects, it gives the object and the person as two, furnishes a new subjective object for consciousness, constructs subjective time, place and degree, its use differentiates men from each other and from all animals, it gives intensity inversely as the number of simultaneous objects, joins sensations in association and memory, heightens sensations and ideas, and in expectancy inhibits irrelevant sensations and constructs images in advance.)

It is possible that many of the writers quoted in this chapter have, in their discussions, omitted factors which they might include as elements of attention or as connected with it, such factors being notably the motor operations on the one hand, or the interests and emotions on the other. Certain terms applied to attention, such as state and faculty, have fallen almost into disuse; at the same time new designations have come into vogue, such as relating activity, constructive power, and primary act of mind. It is, however, of greater interest that gradually there has been introduced the idea of efferent impulses, motor innervation and inhibition, whether applied physiologically or psychically; and that with all this there is a nearly general consensus of opinion that attention has its roots in the feelings, while it is on the one hand a control of the impulse and organ, and on the other hand an activity lying at the basis of consciousness and knowledge. Finally, from the side most reviewed in this chapter, that is from introspection, the tracing out of attention shows the complete and inseparable relations of the three functions feeling, intellect and will.

CHAPTER IV.

THEORIES OF PHYSIOLOGISTS AND OF EXPERIMENTAL PSYCHOLOGISTS FROM FECHNER TO THE PRESENT.

We have now come face to face with the modern and the latest as well as the boldest theories on attention, and we are now to study the contributions of departments of science which have vastly furthered our knowledge of attention and which, while they have often erred in the conclusions arrived at, have ever been the fruitful source of larger and more exhaustive theories. We refer to the departments of physiology and of experimental psychology, whose influence has been traceable in the conceptions presented in the third chapter. We shall here first group together the views of such physiologists as have written with definiteness on our subject, while under this head may also be included the theories of some authors who, while not well versed in physiology, have yet taken their point of view from that science.

The only writer from Germany to be referred to here is C. LUDWIG.* This writer discusses the organs of sense and the means of stimulating them, and only briefly alludes to attention as that which makes the impulses felt on one hand, and on the other makes the vast number of impulses to be unfelt when it is directed away from them.

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* *Physiologie*, Bd. I, ab. 5, s. 593, etc.

The English physiologists contribute seven authors to our list and these represent widely varying theories. **Henry Holland*** treats of our subject in connection with his studies of the so-called stigmata. He regards involuntary attention as entirely passive, something akin to sensation and having its origin in all impulses not from the brain itself, that is, all impulses from the organs of sense and from the trunk of the body. Voluntary attention, he teaches, originates in the mind, is active and gives increased power of perception; its physiological correlatives are inhibited nerve reflexes, and also a certain "nutrient reflex" or flow of blood to the organs and to the parts innervated; it is characterized by a longer continuation in time, and may itself become involuntary when the flow of blood to special parts becomes so extensive as to leave other parts and their centers deficient in blood and unable to interfere with the acquired but now fixed direction of attention. Under this theory the stigmata are considered to be permanent effects of the mind voluntarily directed to a part. With Holland, attention has two features: the non-voluntary exhibits mental receptivity on the one hand and impulses of sensations on the other; the voluntary shows psychically a mental activity, and physiologically arrested efferent impulses with flow of blood to the parts concerned.

William B. Carpenter† discusses attention in its relation to the abnormal states. He claims that a fundamentally involuntary attention is exhibited in the action of persons hypnotized, of somnambulists, those practicing spiritualism, and of other similar classes of people. Very much as Leibnitz and Ward, he teaches that inattention is a general consciousness of the existence of sensations in the sensorium through impulses in the sensory ganglia, while yet there is no discrimination of these sensations. The effect of attention is then to distinguish the various sensations and to furnish "content" for perception, and judgment of objectivity and of externality. This act in the abnormal cases of hypnotism, he says, exhibits the will of others, while in the normal state it exhibits one's own will. The theory of Carpenter is connected with his idea of "unconscious cerebration," in which case there is no attention, all consciousness is connected with voluntary attention, while the involuntary is abnormal.

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* *Medical Notes*, p. 47.

† *Mesmerism*, pp. 12–49; *Mental Physiology*, pp. 25–6 and 130–147.

So far we have not had any peculiar physiological trend in the theories presented, but we meet this distinctly in the views of HENRY MAUDSLEY.* As basis of his theory, he regards nervous energy to be the highest possible force; these energies are stored up in the cells in the form of "impressions," "organization of faculties," memory and so on; on stimulation, currents of energy are transmitted from cell to cell, producing feelings, thoughts or volitions, and these products appear internal in consciousness while they are external in the nerves; finally, he considers a psychical reflex to be a current in the cortex from a sensory to a motor center, whereby the impressions become thought and speech, or volition and movement. Attention has nothing to do with the psychical reflex, he says, but is the arrest of a current of energy, the temporary suspension of action between cell and cell, and so the very opposite of Hartmann's centrifugal nerve currents; while this arrest of transmission at any time produces a particular tension, and this in turn gives the sense of strain observed in attending.

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* *Physiology and Pathology of Mind*, pp. 136–144; *Physiology of Mind*, chaps. II–V.

With Thurot he regards attention to be an activity different from reflection; but, unlike the French writer, he finds them both in the cortical nerve cells. He teaches that intense attention to the representations in memory may so excite the sensory center "by a reaction of energy upon it" as to make the representation equally vivid with the original presentation; generally, however, a stimulus from without gives a more vivid attention because sensory and motor cells are, he asserts, both joined in the results and the arrest is greater. He calls the subjectively derived attention inferior and the objectively derived superior, but his theory is beset with many difficulties as he endeavors to explain how one cell reacts on another in the former case. He defines involuntary attention as compulsory arrest of radiating energy because of the nature of the stimulus or because of the interest for the object; on the other hand his distinction of voluntary attention from involuntary, in the operations of nervous arrest, is far from being clear. His theory strongly emphasizes the value of attention for memory and for knowledge, in the fact that the arrest of radiating energy causes a fuller registration of impressions in the centers. He includes muscular innervation as a minor factor in attention and, agreeing with Hartmann that attention increases sensibility in the particular case, he explains that the accompanying molecular changes propagated outwards to the peripheries or down to lower sensory ganglia, set motor nerves to work and so motor innervation adds to the feeling of arrest, while it may even supplement an original deficiency in the sensories and thus still heighten perception.

Our author is quite original in his idea that attention has as its end the attracting of consciousness: involuntary attention does this by the "psychical reflex," while voluntary attention accomplishes it by reflecting energy from associated cells over upon the cells concerned; in the same way the process in mental abstraction and reflection, through associated motor innervation, stirs up a cell to a pitch which arouses consciousness. In brief, attention increases "sensory presentations" and "motor intuitions" and these excite consciousness. He finds the physiological conditions of attention to be many; among these the following may be specially enumerated: heredity and its interests, education and its influences, the professions and their results, excitation of the proper ideational tracts, reaction of the perceptive center upon the motor factor, and increase of local vascular activity. Maudsley's view is almost completely physiological and may be summarized as follows: attention is an arrest of a central nerve reflex with an accompanying motor innervation heightening the object or idea, it is voluntary or involuntary and leads to consciousness, it is always attended with feelings, it differs from reflection, and its registration is essential in memory and in knowledge.

The views of DAVID FERRIER* are less bold than those of Maudsley but in the same line of thought, and to understand him it is necessary to keep in mind that he regards the ideation centers in the brain as originally coherent with the motor centers, both under their control and controlling them. He uses the term "faculty of attention," and describes it under the four forms of non-voluntary, voluntary, intellectual and expectant.

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* *Functions of brain*, chap. XIII, secs. 17–19.

Non-voluntary attention, he says, is a passive reflex action following various external changes, it manifests itself in consciousness with an intensity directly as the stimulus and in such phases as a train of associated ideas or a reverie. Voluntary attention answers to Wolff's description of it, the concentration of the organs and of consciousness upon one of the many objects before them to the exclusion of the rest, which action is accomplished on the psychical side with a feeling of effort and of fatigue, both arising from the muscular operations involved. Intellectual attention is the voluntary for purposes of knowledge; it can be concentrated only upon things either capable of being visualized or connected with visualization as, for example, a base note and a drum, and it is always exhibited by the same movements of the head and eyes as in close looking. Expectant attention is in our author's view much as Kirchmann's with physiological elements added; it shortens all reaction time by a previous picturing of the scene and by preadjustment of organs and muscles, together with a half accomplishing of the muscular act in advance.

In the same manner as Hartmann, but more scientifically, he locates the attention centers in the frontal lobes along with what he finds to be the motor centers for the head and eyes, and these are one and both organically connected with associated sensory centers. His reasons for this localization are as follows: 1. there is a similarity of the movements in attention to those in vision and audition; 2. when, on stimulation, attention is given to subjective visual and auditory sensations, the actions resemble the motions when the angular gyrus and the superior sphenoidal convolution are electrically excited; 3. there is a diminution or extinction of extension, on partial or complete destruction of the frontal lobe; and 4. in the rising scale of animal life, increased capability to fix attention is commensurate with increased size and prominence of the frontal lobe. He qualifies this attempted localization, however, by saying there is no special seat of attention. Further, he agrees with Wolff in regarding attention as the point of difference between the higher and the lower faculties.

On the whole, Ferrier teaches: attention is, physiologically, a rapid nerve reflex for the non-voluntary form, and inhibited reflex with muscular tension for the voluntary form, it is kindred to the movements in vision and in audition, and it is an adjustment of organs and muscles through the motor centers of the frontal lobes; psychically, attention is the general awakening of consciousness with intensity as the stimulus for the non-voluntary, it is the concentration of consciousness with feelings of effort in the forehead for the voluntary; and finally, it is essential to all intelligence.

The views of G. H. Lewes* may be classified under the two heads of attention from the standpoint of consciousness and attention from the standpoint of reflex action. He uses sensation as synonymous with impulse, he maintains that attention only isolates but never originates sensations, and he asserts that it does not always produce after-images and memory. His theory occupies a middle ground between that of Maudsley and of James.

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* *Problems of Life and Mind*, Series III, probs. II and III, pp. 184, 218 and 265 seq.; *Physiology of Common Life*, vol. II, p. 50 seq.

Reflex action is, he says, the active phase of attention, and is the motor part of it as exhibited in muscle innervation; this action originates only in impulse, but the innervation then set up, together with the flow of the blood to the parts concerned, may increase and thus give increased attention. The word effort defines this view, and the view would include the whole of attention for Lewes except that he finds there may be innervation without attention and also that effort is both organic and conscious. From this point of view, muscular fatigue in innervation explains diminishing attention; attention is always given to the stronger stimulus, for that is innervation on the stronger impulse; experience and interest go together by opening up tracts of nerves and developing muscular responses and thus causing the organism to react better on one stimulus than on others or, what is the same thing, attend one impulse rather than another. He tries to explain the discrimination of attention by an illustration from the auditory nerve: stimulating the organs of Corti produces attention to sound because, when the central reaction takes place for the nerve of hearing, the reflex is on the lines stimulated or, as he puts it, the quality of attention is determined by the "auditory neural unit." Further, he teaches, the more highly developed and complicated organ secures attention in preference to a lower, a phenomenon well observed in the fact that reflexes in vision often precede reflexes in touch as when a light object at first unfelt on the hand is distinctly felt after it is seen. Thus far we have the physiological side.

In many ways he indicates that consciousness and attention are one and the same, as : "attention represents consciousness," "the conscious state is an act of attention," "attention [for a particular case] means consciousness," and so on ; yet he will not positively assert their identity for, he says, "to have sensation and to be conscious is the same thing," but "to have sensation and to attend it are two different things," while "attention is the direction of consciousness not the consciousness itself." He regards "fugitive attention" as a sort of subconscious state, inattention as altogether an unconscious condition, and oscillations of attention as simply alternations of feelings.

Contrary to Brown and Bain he limits the vivifying power of emotions to effects on the subjective only, for in the processes of thinking attention is an energy of interest which suppresses all incongruous thoughts. In this same process where the subjects of thought are the recalled objects of sense, the attention is partly made up of ideal innervations of those muscles used in observing the given objects. With reference to extent of attention, he argues that experience diminishes conscious attention while experience and interest together increase it as explained above ; as the opposite of interest, such feelings as prejudice, bias, etc., destroy all attention, even the capacity to attend, in certain directions.

On the subject of "double personality" he finds an explanation in the two shifting standpoints of attention where the consciousness rapidly alternates between attending from one point and then from the other. This completes his view of attention from the psychical side.

Our author gives a few other points which cover both the sides presented: ideas which excite motor impulses take two directions one of which is attention in consciousness and the other of which is attention in activity of muscle and organ, while both are felt as effort in consciousness; again, attention is a measure of the nervous and other activities, so that reflex action and consciousness are proportionate to the physiological forces; and, once more, "the extremely obscure and delicate adjustments of attention give us the inductive means for ascertaining many motor movements not otherwise recognizable." The division of attention into the reflex and the conscious forms enables our author to turn to which side he will with reference to the difficulties to be explained in experience or in logical thinking. Broadly stated, Lewes' views are as follows: attention is a two-faced operation governed in consciousness by emotion and in the organism by definite and accustomed modes of reaction, while its two forms are muscular innervation and a sense of effort.

The theory of W. CYPLES* is a bold development of those of Maudsley and Lewes, and with him "the question of attention is the most complicated one in all psychology." His theory begins with the assumption of a "neurotic diagram" as the basis of mental action, which diagram is an indefinitely located and changeable nerve current in the cortex, described by himself as a peculiar physiological activity between central molecules and fibers; specific motions in a "diagram" result in actualization of the ego and this is the germ of attention. He uses the term "cues" to mean an associated action of two or more organs through habit, and he teaches with Leibnitz and

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* *Human Experience*, chap. VI, pp. 122-160.

Wolff that each sensation is an aggregation of partial ones.

The various forms and workings of attention as taught by our author are here presented. Attention is externally a prevention and internally an arrest of the impressions which muscular action would register on the organism. This inhibition either controls the organs so as to prevent all impulses, as Jouffroy taught, or it prevents such a part of the aggregate as keeps the remainder of the impulse below the threshold of consciousness; so also the activity of the "diagram"—as the attention for the time—may block up the sensory path by an impulse from the center; while in another way, namely by "dissociation" of fibers, all communication with the "diagram" is prevented and the inhibition is complete. Concentrated attention in subjective matters is possible, he teaches, because the central diagram and its associated fibers inhibit all impulses from external stimuli, and because the associated working fibers start "incomplete neurotic diagrams" which act in turn as reservoirs to continued attention. On account of the great prevision vouchsafed to imagination, the molecules and fibers never fail to maintain attention, for imagination supposes "the consequences of success and failure" and on this estimate the will, with the whole organism, gives the "diagram" a strength above all probable opposition or distraction.

Concerning "cues," he gives a number of points: words are the greatest cues in starting or checking a "diagram," and so there can be no concentrated attention in dreams because there are no words heard; attention is made to disappear by "cues" because the muscular activities in the several organs come to succeed each other on the least associated reflex without discharge of the "neurotic diagram"; and so also, a man in reverie unconsciously walks through the streets observing nothing, because the least exercise of one activity gives cues for the proper exercise of associated activity. Again, in the case of the miller, weaver, etc., and the noise of the machinery, there comes to be no attention to the noise because the fibers and molecules get set to act at such a rate that there is really no stimulus from the recurring motions; sudden changes in those recurrences, however, shock the order set up in the brain and produce attention.

We select three effects of attention from among the many indicated by our author. Transcending the assertion of Stewart and Hartmann, he contends that attention multiplies many sensations and ideas. Somewhat after the manner of Holland, he maintains that attention sends back currents from the center through fibers to certain parts and produces the phenomena of stigmata. By using imagination and memory, attention enables one to so group the molecules and arrange the mechanism of the brain as to awake at a specified time; this result may be due either to the activities within working up to a climax at the appointed hour or to aid given by the general concurrence of things without.

In brief, Cyples teaches that attention is the beginning of self-consciousness, that it is the inhibition of muscular acts and of their effects in the brain, that it is a hindering efferent impulse, that it is accompanied with a foresight preventing all interruption, that it decreases under the influence of habit, that it is will, and that it heightens sensations and ideas. We add that we have no system to present so complicated as that of Cyples and none so ingenious, but withal none so theoretical in nature; while it is also to be noticed that there are included therein a number of assumptions concerning the central nervous system which are wholly without foundation.

We meet next with the theory of H. C. BASTIAN* which involves Condillac's on sensations and Hegel's on the subject and object. He considers that feeling has been superadded in the higher forms of animal life as a correlative of nervous action, that the various phases of consciousness are correlatives of molecular changes in the brain, and that sensation is always in consciousness. He discusses attention from the standpoint of consciousness: it lies in will, it is concerned in every perception, and as one of the ultimate forms of sensation, is present in every conscious act whether of knowing, feeling or willing; the attention as intellectual in the sensations gives the non-ego, and as emotional in the sensations gives the ego; finally, all mental acts are sensations in consciousness, and attention is a phase of every conscious state. He avoids all questions of activity and of passivity by including them under the head of nerves and muscles.

Our review of the conception of the English physiologists has been fruitful in various ways, the range of views is extensive and there is large venturing upon new grounds. We have yet to present the theories of two American physiologists, before closing this section of our chapter.

CHAS. F. TAYLOR's† theory is incidental in a medico-physiological work on Pain. He admits the possibility of several simultaneous sensations and contends that the relatively paramount sensation decides attention; with no attention at all there is no conscious sensation; further, the impulses, whether objective or subjective in origin, become conscious sensation only when the whole attention is not occupied elsewhere; while, with reference to feelings, he follows Bain and considers their influence on attention to be great. It is interesting to note the various forms of attention which he cites, such as self-observation, anxiety and alarm, and so on. Without being at all a pessimist, he holds that attention especially establishes conditions favorable to experiences of pain.

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* *Brain as Organ of Mind*, chap. x.

† *Sensation and Pain*, pp. 16, 57 and 75.

S. V. CLEVENGER* enlarges upon Holland's "nutrient reflex," and regards attention as a flow of blood to the stimulated organs. This flow is produced by a central irritation and the result is the denuding of other parts. In expectant attention the flow is before the stimulation, the neighboring areas are inhibited vaso-motorially and reaction time is shortened. As this conception is only part of a larger theory which regards life and organism as the result of chemical action, the ultimate conception of attention here is that it is one of the higher results of the attraction and the repulsion of elements.

A brief review at this point will enable us to mark what has been the gain on the part of the physiologists concerning the conceptions and the explanations of attention. It is significant that a great number of neurologists and physiologists have nothing to say upon our subject, and it is noticeable that those who have written regarding it, while freely making use of the theories already advanced by psychologists, have themselves set forth no new idea from the standpoint of consciousness.

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* *Physiological Psychology*, pp. 130 and 178.

The factors herein described as constituting the physical part of attention are reflexes, innervations and inhibitions: the reflexes are both the excited flow of blood and the impulses set up in the motor nerves, the innervations are variously regarded as central discharges or as terminal reports, while the inhibitions are looked upon as twofold, having either the form of arrest of motor impulse or of arrest of muscular action. The theories regard these factors as forming the whole operation, or they combine the factors in various ways, as follows: Attention is either a nervous reflex, a nutrient reflex, an inhibited nervous reflex, a nervous reflex together with muscle innervation, or an inhibited nervous reflex along with muscle innervation. This, however, only describes the circumference of the field, it remains to be seen whether the laboratory can throw any light upon the areas within that circumference.

An investigation into the views of the experimental psychologists introduces one into that element which is the interest and the charm of the new psychology, the element of definite experiment with living subjects under various conditions. These experiments have already been numerous, are on the increase for the present, and are likely to be vastly multiplied in the future; while if the laboratory does not settle for us all problems, or even the great problems, its patient processes and careful conclusions are both raising and answering questions that are significant as parts of the great general problems. We shall not undertake to give an account of the varied experiments, these may be found in the works referred to; we shall only briefly summarize the conclusions and indicate the theories involved.

To G. T. FECHNER* belongs the honor of introducing into psychology the method of experiment and of inductions therefrom, which Bacon had meant to initiate in all the branches of science more than two hundred years before. He describes a psycho-physical activity as separate from bodily sensibility, a division which has its basis like the theory of Czolbe in a notion of the universe as pan-psychic; he makes Leibnitz's hinted-at term "threshold" to become classical in psychology by his use of it, describing in order a "stimulus threshold" of the organs, a "difference threshold," a threshold for sensory nerves, and "a psycho-physical threshold" for the sensorium, in connection with each of which steps the impulses and the sensitivity must reach a certain limit before further transmission and before attention is possible; and he advances the idea that the condition of sleep in an organ is only the state of inattention with reference to that organ.

The distinguishing of stimuli in kinds and in intensities occupies a large part of Fechner's investigations, while attention is the differentiating of the sensations produced by these varied stimuli, and also the discriminating of just observable differences between the sensations from the same organs. He points out that the stimulus may increase in intensity while at the same time the attention to the impulses may diminish or disappear, that a presumably strong impulse unperceived because of other occupation of the mind becomes markedly perceptible on attention to it, and that strong after-images remain unnoticed until the attention is turned towards them; so in the same way, without clearly defining the sensorium, he finds that impulses remain there undistinguished until attention is brought to bear upon them. All these facts, he asserts, indicate the non-physiological nature of attention.

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* *Psychophysik*, Bd. II, sec. XLI; *Hauptpunkte*, etc., S. 177–180, 242–248 und 269–284.

He differs emphatically from Herbart and the sensational school by his conclusion that strength of sensation and strength of attention are wholly diverse things, the former giving us no experience of self-activity like the latter does. Neither does attention heighten sensation, he says, as many had assumed, but it only brings out the sensation to such an extent as lies in the intensity of the conditioning stimulus and impulse; while on the other hand attention may be given to several sensations at once and then each of them appears less vivid in consciousness. He further finds that there are two classes of attention: the involuntary, which is the effect of contrast, variety and force in the stimuli; and the voluntary, which is the outcome of "more general and higher psychical occurrences." After this review, Fechner's theory is best described in his own words, "attention is a psychophysical activity."

WILHELM VOLKMANN* makes important advances with regard to the conditions of attention, uses the terms presentations and apperceptions after the manner of Leibnitz and Herbart, and speaks of the somatic feelings, "Gemeingefühl," as the borderland between organism and consciousness; wherein the somatic feelings are influenced in two ways, first by the homogeneous and the heterogeneous nature of impulses, and then also by attention. He teaches that attention is of two kinds; the one physiological, controlling the organs and reacting on stimuli, the other psychical, controlling the presentations. In this connection he makes a distinction between the act and the state of attention: attending is controlling the conditions whereby attention is secured and, whether for the physical or the psychical side, attending makes a "*tabula rasa*" for attention and maintains that condition.

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* *Lehrbuch*, Bd. 2, S. 193–203.

From the view of consciousness he dwells upon the great effects of interest on attention. Interest he defines as the harmony of a new presentation with the prevailing presentations of the past, and he shows his realism by declaring that here we join to ourselves something like that of which we are already composed. Instead of considering apperception as is usual from the standpoint of attention, he reverses this and regards the latter from the plane of the former: whatever excites apperception excites attention, and the degree of the first is also the degree of the second.

From the somatic side, he makes out there are a great number of factors; these are stimuli, impulses, stimulation of similar or of disparate organs, nervous structure, bodily condition, the central endings, readiness and practice. Here he well explains the greater sharpness of organs or their increased sensitiveness in attention by the developed differences in the central endings and their readiness to respond.

Volkmann is among the first to extensively demonstrate the effects of expectancy. Here he shows that when there is anticipated a certain class of stimuli, auditory for instance, and a stimulus of another class is given, the attention is the inverse of what it would have been were there expectation of stimuli in general only. He further concludes that exceptional stimuli receive attention by contrast. Classifying attention into voluntary and involuntary, he claims that, in particular cases, these two may be so related as to destroy each other: the only apparent explanation of this novel idea is from the view, not so stated by the author, that the involuntary attention is altogether somatic and may be unavoidably antagonistic to every preference.

With Cyples he regards the problem of attention the most difficult in psychology, its outlines are, he says, not easily defined, and it may be a general phase of many problems. He accounts for the rise of the theory of "faculties" by the fact that the problem of attention was, as it is yet, unsolved. Volkmann's experiments are invaluable, he considers attention to be a certain condition in the somatic state and in consciousness, corresponding to the stimuli, the impulses and the organic state, and he looks upon it as dependent on the whole round of experiences and feelings.

The views of CARL STUMPFF* are closely allied to those of Volkmann, with special conclusions of his own from experiments in the domain of tone sensations. He agrees with Volkmann that attention gives the organs efficiency in practice because of a better connection and readiness in the center end-organs: here, he explains, better attention gives better memory and that gives a more correct judgment for action. With Laromiguière he makes attention the ultimate basis of all intellectual activity; in harmony with

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* *Tonpsychologie*, S. 67–87 und 373–392.

Fechner he teaches there may be attention towards one organ and a state of sleep in all the others, as also complete sleep in the sense organs and great attention in the centers as shown in ecstacy and dreaming; very much as Fechner he contends that attention only vivifies sensation up to the normal limit of the impulse and of the nervous system, adding that attention keeps the resultant sensation longer in consciousness and so with better results in association and memory; and finally, with Hartmann he teaches that attention makes use of a centrifugal impulse for calling weak impulses above the threshold and even for originating impulses in hallucination.

He claims that attention is of more interest and importance in auditory sensations than in those from any other sense organ. In confirmation of his idea that practice sharpens the central end-organs he argues that Beethoven's increased efficiency in music after he became deaf was certainly not due to enlarged capacity of organ for stimulation but to effects of attention in the cranial centers. Here he also introduces his conclusion that reaction time is proportionately more shortened by practice for the auditory than for any other system of nerves, while he argues that the changes at the center are the only explanation of the fact.

With reference to other points he speaks as follows: the conditions of attention are the personal constant as found by many experiments; practice, fatigue, and the state of the central nervous system with reference to sleep; as also hunger, thirst and the nutritive processes. The excitations to attention are the stronger stimulus, the impulse most agreeable to the organism, the sensation which recalls interesting ideas, and other sensations defined by him as the basis of volition. Further, attention may be measured in terms of stimuli; and finally, weariness of attention is entirely a physiological matter due to want of nourishment. One more special point is the identifying of attention with interest and feeling, and here comes in the explanation that when one phase of attention ceases it is the cessation of the particular interest and feeling by being absorbed back into the general feelings which form the background of psychical life. To summarize what Stumpff says: attention is the first step in the psychical activity, it is one interest prominent above others, while the impulses to it are affected by physical and physiological states, are heightened by practice, diminished by fatigue and increased by centrifugal currents of central origin. To say the least, it is confusing to call sensation and feeling the same, while Stumpff's theory of attention as a feeling leads us to a still more positive view in this direction.

In the theory of ADOLFF HORVICZ* the feelings and emotions play the most prominent part, and all these are classed under the two heads of feelings directly excited by objects of sense and these same reproduced and modified. He describes attention as involuntary when there is impulse and no consciousness, but as voluntary when there are agreeable or disagreeable feelings. Dwelling most upon voluntary attention, he claims that it is of different degrees and that these degrees alone explain how, with the same normal condition of organs and nerves and for the same person, the just observable difference is at one time $\frac{1}{80}$ gram more but at another time only $\frac{1}{50}$ gram more for the same weight. Any stimulus, he teaches, may therefore produce voluntary attention by awakening feelings, while an occupied attention can be changed only by some stimulus which arouses stronger feelings: emotions, however, have their limit in time, a thing which our author does not account for. They cease their control and the new feelings need not then be so strong for the phenomena of attention; and when there are no marked new feelings the attention follows in a law of association, which law, he says, explains the odd case of calling up a few just previously unattended strokes of a clock which is continuing to strike.

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* *System der Psychologie*, Bd. I, sec. 12 und 48.

In the co-working and cross-working of involuntary with voluntary attention and of stimulus with feeling, he contends that any attention to a particular impulse depends upon the degree of the stimulus and upon whether the attention is directed either to related objects, to those different, or to no objects at all. He is not sure for all cases, but generally, he claims, the attention awakened in feeling is necessary to the consciousness of all psychical objects. He is not able to find grades in the scale of feelings corresponding to those in the scale of attention, and herein our author's theory is either incomplete or not susceptible of demonstration. In brief, Horvicz teaches that impulse and reflex action constitute involuntary attention, and that the voluntary is identical with feeling or with the stronger of several feelings, and that it alone is productive of consciousness. He makes more of feelings than any writer whose views we present and he regards all feelings preceding attention as of a subconscious character.

We are able here to give only a brief reference to the theory of **Mach** who, as reported by Ulrici, regards attention as entirely an organic and physiological act consisting of the accommodation and adjustment of organs on a stimulus. In the eye, for instance, this operation would be the changing of the pupil and of the lens and the re-arranging of the axes.

The contributions of HERMANN HELMHOLTZ* are from the field of optics as those of Stumpff are from the field of acoustics. Advancing less of theory and giving more of the effects of attention, he opposes Horvicz's notion and regards attention as governed by ends in intelligence and not exclusively by feeling. We attend sensations, he says, only as we find them of use to a better knowledge of external objects while we inhibit all others from the domain of consciousness. He points out the value of attention in the discoveries made in optics and cites the facts brought out by Purkinjé and Mariotte as fruits from attending eye sensations. He opposes to Mach's idea of the adjustment of organ and of nervous system alone, the notion that there is also a psychical element in the centers. His points towards this conclusion may be classed as follows: 1. the mind always perceives the two impulses in binocular vision as one; 2. yet an individual may attend the impulse from one eye only and at the same time notice a second and shadowy object from the other eye; and 3. the oscillations of attention, when a single object, color or figure is placed before one eye and a different one before the other, can be stopped only by some purpose or interest from the psychical side. Attention is thus an intellectual element, Helmholtz says, but often settled by interest.

KARL FORTLAGE† uses the usual terms content, apperception, field and focus, in his discussions of attention and of its relations. He concludes, much as Brown and Maudsley, that there is just so much force of attention whether in the nervous system or in consciousness and its objects; and that this force may be divided over a large field, limited to a few objects or focussed down to one. Like Kirchmann, he teaches that expectant attention stimulates the centers to fill up the focus with an image of the object and this makes the real object to be perceived the sooner; so also he agrees with this author and with Stumpff that attention holds a sensation longer in consciousness and causes, on that account, 1. comprehension, his term for the mind's closest connection with the content, and also 2. association, or a better union of this content with others. He explains that when the content of a sensation represents a very limited object, that object becomes better known because the quality given in the focus has thereby a closer union with all the other qualities of the object given in sensation.

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* *Handbuch der Optik*, ab. 3, sec. 26, S. 431–4.

† *System der Psychologie*, Bd. I, secs. 12 und 48.

With Horvicz, he teaches the prevalent influence of feelings on attention and classes these feelings as the acquired and the just excited, or as of inner and of outer origin; the attention often oscillates between these inner and outer feelings according as those from the impulse are strong or weak. His concrete illustration of this is a pursued and thirsty deer which hastily takes swallows of water at a stream and yet exhibits unrest, as its attention is controlled now by the general desire of individual safety and now by the temporary desire of thirst. Further, he points out how contrasts and abruptness in sensations excite attention. In conclusion, Fortlage regards attention as the mind's act of apperception, as that which retains the sensation and appropriates it for knowledge, memory and association, and as preeminently moved by feeling.

If Fechner is the first in laboratory work on attention, **Wilhelm Wundt*** is thus far his most promising successor in the same line. He regards "presentations" as the only objects of consciousness and as "psychological syntheses" from sensations, and with Leibnitz defines perception to be the entrance of a presentation into the mind's "field," while "apperception" is a further entrance into an "inner circle" of this field.

We present his views first from the psychical standpoint. Attention, he says, is an activity which marks the difference between dimness of consciousness and clearness, or between perception and apperception. He agrees with Hamilton that there is a certain amount of subjective intensity and this is proportionate to the area attended, while he adds further that the field of perception is darker as the area of apperception is brighter. With Helmholtz, he demonstrates that we may vary the field and focus of attention while the organs, and especially the eye, remain fixed, and he also shows that each element of a scene or of a tone may receive concentrated attention in its turn.

On the subject of attention to many objects at once he differs from Stewart and has much to say: the "inner circle" may be widened so as to have no clear line of demarcation from the "field"; when there are disconnected objects of vision, he says Cattell's demonstration is correct that the maximum number of objects simultaneously attended is four or five, which confirms the view of De Tracy and of Hamilton; when the objects of vision are joined as parts of a familiar whole we may attend twelve or fifteen presentations at once as the full compass of attention ; by grouping objects into one presentation for sound, and then, by a mechanical device, arranging a succession of grouped presentations, he finds attention may include a still larger number, that is, with a pendulum ticking at a favorable rate decided by experience and with a connected bell struck at every four or eight ticks, sixteen single or eight double impressions are held in attention, while with rhythmic arrangements added five groups of eight ticks each, or forty ticks, are held in the mind at once. In this latter experiment however memory comes in as a factor. When the field of apperception is enlarged, he continues, simultaneous impressions from the same or disparate organs blend together, through attention they form the elements of a "complex presentation," and only when attention is focussed upon one of these elements does that particular one come first in consciousness and precede others in a succession. This is shown by the clock work with indicator and bell, in which the sound or the sight attended appears to be first though both are simultaneously produced in the instrument. This apparent precedence is also well shown when attending the tones, overtones or undertones in a musical concert.

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* *Physiologischen Psychologie*, Bd. II, ab. 4, cap. 15, 1-4; cap. 16, 1-4; cap. 17, 4; und cap. 20, 1.

Again, subjective strengthening of the field of attention by narrowing the field of consciousness, together with memory, makes an important element in "complex presentations": when there is a weak impulse, the memory holds each successive dim presentation until the attention unites them into a whole of sufficient clearness. As to other points, he agrees with Leibnitz and Stewart that any number of tones and of elements may enter into the presentations for attention; so also he makes experience a background for consciousness in which attention discriminates the particulars, as when a child at first unites horse and rider, plant and house, etc., in one perception, but reaches an apperception of each of these objects later by a limiting of consciousness in attention.

We next present Wundt's views from the physiological standpoint. Attention or apperception results from fixating the object, from sensory impulse, and from motor innervation, this last being regarded by him of peripheral origin. Attention is thus a double operation: a sensory presentation in an efferent impulse and a motor presentation in a muscular effort; and when the first alone cannot produce attention, its combination with the motor factor does so, while the two co-operate in one result because related through the same organ. In this theory the sensory and motor conspire to secure attention, as in Maudsley's view they unite to "attract consciousness."

As regards stimuli, he finds that a moderate degree of intensity is the best for securing clearness in that it does not excite too much effort of attention, and since motor adjustment of muscles should accompany stimulation, the most favorable condition is when the degree of adjustment corresponds precisely to the degree of stimulus. Lack of harmony between the motor and the sensory, with excess of the latter, gives dimness; while our author does not state what he considers would be the effect of an excess in the motor. It is also interesting to note the theory of the interaction of the sensories and motors in which one is said to call forth the other and this reacts on that so that up to a certain point the two "increase each other." He also points out that muscle innervation goes with all thinking. Attention in recollection requires muscle innervation as shown by the feeling of effort in the act; in expectancy of known objects, attending depends on the motor innervation which a memory of the past experiences recalls to be necessary for the sensory impulse, and so a precise adjustment of organs is made beforehand. In surprise we have just the opposite, a belated muscle innervation.

As to other phases of the subject, he classifies attention as voluntary and involuntary. In the latter the direction is limited to the one presentation or to the one unusually strong; in the former there is inner activity and the direction is given to one of a few or of several presentations. As does James, he makes attention to the idea of willing something, to be condition for carrying out the act; and this latter physiological factor of attention necessitates a delay forming the chief element of time in attention, while practice makes idea and act to be nearly simultaneous; an explanation very different from Stewart's sharpening of organs or Volkmann's readiness in the central endings. His great factor in attention is "motor innervation," and the chief problem in rapidity and skill lies in the celerity of this act. With Ferrier, he regards the centers of attention to be the motor regions in the cortex. With reference to feelings, he says the sense of effort is never increased without desires, so that consciousness and attention are thus far dependent on feelings, but these latter themselves are only inseparable elements in each experience and themselves dependent on conditions. Feelings are not a pre-eminent antecedent to attention but are important for its continuance.

On the subject of the continuity or the discreteness of attention, our author uses ingenious experiments made by himself and others, to show that attention is discrete both physiologically and psychologically, and that for the organism an apparently continuous attention is composed of the alternation of motor effort with relaxation of the same. The experiment showing discreteness of attention also introduces for us the subject of attention time. In simple reaction, attention time is that interval which is needed for motor impulse and for apperception; while with signals in experiment, attention shortens reflex action because of the greater readiness and activity of the innervated muscle. Negligent attention makes the reflex to take two or three times the usual interval. Finally, attention time is much more disturbed by the stimulation of disparate than of similar organs; and when we have two simultaneous impressions from disparate organs conjoined by the attention rapidly passing from one to the other, the impression first attended takes a relatively shorter and the one second a relatively longer effort, while the first takes a longer time for attention than when alone.

Wundt's conclusions and theory may be thus summarized. Psychically attention is a concentration of consciousness upon fewer objects, and it is discrete; as involuntary it follows a single or a very strong presentation, while as voluntary it is an inner activity among several presentations; it is both a sense of passivity and of effort; it requires time for a change from one to another object; it takes in as many as five visible and sixteen audible impressions at once; together with memory it heightens weak impulses; it is also conjoined with interest, and is a factor in memory and association; and it gives the order of succession in consciousness. Physiologically attention is a sensory with its corresponding motor impulse, it is active and discrete, as motor innervation it is essential to recollection and ideation, it shortens reaction time in expectancy and in practice while it protracts it in surprise, and it heightens presentations. Finally, attention with its degree of activity is the subjective element of apperception, as the stimulus with its degree of intensity is the objective element for the same. Wundt admits there are feelings of muscle innervation when there is no muscular movement, while he totally omits the subject of inhibition.

We next present the views of H. OBERSTEINER,* who occupies in part the point of view of Herbart, teaching that we have only one idea at once and that the strongest, while it is impossible to have two ideas of equal vivacity at the same time. He agrees with Wundt so far as to call attention a motor operation, while with him and with Ferrier he locates the attention centers in the cortical motor regions, because degeneration of the motor regions affects attention and its concentration. He also finds from numerous investigations that any condition of idiocy or advanced stages of insanity have the same results. Strangely enough he uses the term "faculty of attention," but this aside he looks upon attention as a motor inhibition, as emphatically an inhibitory activity which keeps down from consciousness all sensations, volitions and ideas other than the elected ones, while the attention is the more intense as inhibition is more energetic. The speedier work done during this state is because the central inhibition closes all but the most direct course

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* *Brain*, Jan., 1879, p. 439 seq.

Hypnosis

to the point concerned, thus preventing all diffusion of energy. With Laromiguiére he makes all continuous mental action to depend upon attention. From experiments, he finds that the power of attention is possessed more by the cultivated than by the uncultivated, by the younger than by the aged, as also by males than by females. On the other hand he finds that headache, every disturbance of the nervous system, every new sensory impression and every strong emotion interferes with continuous attention. His theory is that attention is an inhibitory effort with its accompanying psychical feeling.

The observations of M. **Allen Starr*** confirm the conclusions of Ferrier and Obersteiner that attention has to do with motor regions of the brain. He collected fifty well reported cases of cerebral disturbances, wherein there were twenty-three affected with lesions of various kinds in the central lobes, and in all these cases one of the mental disturbances produced was an inability to fix attention.

There are a number of authors who regard attention as the explanation of the changes from the normal to the hypnotic state, and there are many evidences which point to at least the partial correctness of this theory. Among such writers is Carpenter, whose views have been partially presented, while other prominent ones are **Braid**, **Beard** and **Schneider**.

G. S. **Hall**† regards the attention theory of hypnotism as obscure and inadequate, while he has many suggestions to offer as to the connection between attention and the hypnotic state. His experiments with hypnotized subjects show that reaction time in general is not unusually shortened in this induced condition but that it is abnormally lessened for word associations. He grants that attention has many elements in common with apperception but objects to any theory which considers the two as entirely identical. It is to be regretted that our author has not in some public way presented his views on attention, or at least indicated the bearings of his many and intricate experiments on the subject. We as a pupil do not judge it appropriate to attempt a systematic arrangement of his views from references here and there in his lectures on psychology.

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* *Brain*, 1886, p. 570, etc.

† *Mind*, Vol. VIII, p. 170, etc.

With reference to hypnotism, the whole attention theory is one worthy of a careful investigation and there is need of a large range of experiments with hypnotized subjects before the difficulties of the theory can be settled.

We omit the names of a number of scholars who have conducted investigations bearing upon our subject but who have themselves expressed nothing definitely concerning it and we now present the theory of one who has written the most extensively upon this topic.

TH. RIBOT* devotes an entire book to the subject of attention and gives us, in a theory involving many of those herein discussed, the most recent view upon this topic. With Wolff he considers all attention to be active; like Brown and others he regards all attention as directed by feelings; and as Wundt and most modern writers, he makes the two classes of non-voluntary and voluntary attention. As regards feelings, he either gives no place for attention in simple reflexes or he would accept the view of Lewes and Hartmann that feelings accompany all reflexes: as attention and consciousness, however, go together in his theory, he probably accepts the former. As concerns the two classes, our author substitutes for "non-voluntary" the term "spontaneous" as a better word, while he adopts the division of Malebranche and distinguishes attention in observation from that in reflection or to internal events.

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* *Psychologie de l'Attention.*

As spontaneous and voluntary attention are his chief divisions, the striking similarities and contrasts in the two are here given in a condensed form. First, both are motor activities and sensations of motor activities in consciousness; both are determined by feelings; and neither can originate anything: second, the voluntary is derived from the spontaneous; the former is a temporarily continuous motor movement, while the latter is a series of discrete movements; the first is determined by feelings acquired and innumerable, but the second by feelings of conservation like hunger and thirst; one gives in consciousness the subject acting of its acquired power on a stimulus while the other gives the object acting of its own power on the same; the former is of inward purpose but the latter is of outward change; and also the one is studied arrangement, the other ready adaptation. The scattered results of spontaneous attention is polyideïsm, or a constant flux of ideas in consciousness; while that of voluntary attention is monoïdeïsm, or a tendency to a single idea. He calls the change from spontaneous to voluntary attention a transference of potential into kinetic energy, just as Lotze hinted; and voluntary attention is a sociological phenomenon because of its development with the increase of social life. He will not allow attention to be called a state in consciousness for that would make it abstract. Attention, he contends, is an entity; it is a motor activity, or the total of all the muscular movements with that of the blood and lungs in the particular case; while the sensation of attention in consciousness is only an accompaniment of these bodily movements.

His greatest distinction between the two classes of attention is the power to arrest motor tendencies and this peculiarly characterizes the voluntary kind. Here, with Maudsley, Murphy and Obersteiner, he finds an inhibition from the central intellectual field which he calls the negative phase of motor activity but to be distinguished from passivity or absence of restraint. In inhibition, he says, the natural reflex on a stimulus is prevented because impulses through the corona radiata out to the muscles are started from the brain by "motor images" operating in accordance with some purpose or plan, and the consequence of the resultant innervation is a sensorial report of effort back again in consciousness. We have now Bonnet's theory of attention as a motor activity alone, subdivided into attention as both motor and inhibited motor action.

Our author adopts the notion that there is no spontaneous attention in the lowest scale of animal life and then he outlines how, from the form of attention in early animals and savages, the struggle for existence has accidentally developed a voluntary attention with an inward instead of an outward compulsion, in which theory he resembles Beneke in founding attention upon "needs" and necessities.

On the matter of expectant attention, Ribot's view on the subjective side resembles that of Kirchmann and Fortlage: there is, he says, a preparatory stage in which the image of the expected object is called up and the real is but an emphasizing of this. On the motor side he finds that the preparatory innervation of the nerve centers and the muscles requires less stimulus and impulse to produce the motor discharge.

In a further analysis of his subject, he regards motion as the fundamental thing in attention. The feeling controlling attention represents pleasant or unpleasant movements, the intellectual images and concepts necessary to voluntary attention come of motor elements, and consequently whether with respect to condition, cause or control, attention is essentially motion, a tendency to motion and an arrest of motion.

As to effects and conditions our author has much to say. Voluntary attention can increase activity in the vaso-motor system, and can cause subjective sensations, while it also affects sensations by innervation of the peripheries and through the sensorial ganglia. The conditions of attention are physiological in health, food, proper exercise and pure air; while the activity breaks down or becomes impaired by too long practice, want of nutrition, stimulants, diseases, excesses and certain drugs. Finally, whether attention be reflex action or its inhibition, our author does not regard all reflexes and inhibitions to be attention, though he views all attention to be reflexes or their arrest.

A résumé of Ribot's theory is as follows: attention is reflex action when spontaneous, and inhibited reflex movement when voluntary: the voluntary is a convergence of mechanism towards temporary unity, with a feeling of relative unity in consciousness instead of scattered states; attention is of all grades from zero up to that of great effort; the spontaneous is greatest by strongest attractions in the organism, the voluntary by strongest resistance; voluntary attention limits activity to restricted parts of the brain, is also initial in the brain, and narrows the field of consciousness; finally, attention is no permanent power like memory.

We now approach the close of this inquiry. A review of the theories of the experimental psychologists is a view of nearly the whole field from the time of Plato to the present, and while many points have been abandoned others which were once barely hinted at are now explicitly brought out. A general summary of what the practical psychologists have advanced on our subject is now given.

Physiologically attention is a motor effort or a sensory impulse combined with motor innervation; it is an act of inhibition, or it is motor innervation in one form and inhibited motor innervation in another; it has its seat in the motor centers of the cortex, it is also entirely a matter of activity and motion, while it is discrete in its continuance, includes the movements of lungs and blood, is dependent on the physical and nervous conditions, and also requires time for its action; further it is a general phase of many problems and, in its effects, causes the central endings and the motor efforts to be more ready in practice, and shortens reaction time. All attention is here reduced theoretically to some form of motor impulse in the nervous system and of motor act in the muscular system, and there have gradually arisen two schools: one of which like Bonnet and Wundt regards motor innervation as the central factor; while the other, like Maudsley and Ribot, considers inhibition the chief characteristic.

Psychologically attention is variously styled a faculty, a state, a feeling, a self-activity and a sense of effort; it may be applied to several objects at once and it is also called a discriminating activity or a narrowing down of and a greater intensity in consciousness; it is ascertained to be discrete in its continuance, has the voluntary and the non-voluntary forms, is not fully coincident with adjustment of organs in seeing, is interrupted by impulses of similar organs but more by those of disparate organs, and is dependent on interest; as to effects, it brings out impulses to their utmost and even heightens them, gives the subject and object, shortens reaction time in expectancy by readiness of image, is necessary to memory, association and all intelligence, and gives the order in consciousness; while finally, it is comparatively greater among the cultivated, the sane, the young and the male sex. There is here a general consensus that attention is a sense of effort for intellectual ends and much under the control of interest, while it is further agreed that it is a narrowing down of consciousness and also that it takes the two variously differentiated forms of non-voluntary and voluntary. A new and notable phase of attention herein brought out is its discreteness.

CONCLUSION.

It is remarkable that Plato's theory, the first reviewed in this research, and Ribot's, the last one examined, agree in one great particular, namely that attention is a motion. The secret hidden in this idea has been brought out by physiology alone and lies in the fact that attention is an effort, a motor effort in the organism and a sense of motor effort in consciousness. What this motor effort shall be regarded remains to be further developed in neurology, while for the present it is viewed either as a centrifugal impulse, a central or peripheral innervation, or an inhibition of one or all of these. The reports from consciousness are being resolved into their elements, and at the same time new figures of speech drawn from physiological sources give new coloring and meaning to the description of those reports.

This then is some of the harvest from our research : attention has its basis in our peculiar organism and its psychical capabilities ; it is developed for each individual by motions of the foetus and of the infant on external stimulations, nervous impulses and growth through nutrient processes ; it is less extensive than consciousness, but equally intensive with it ; it is controlled by the results of experience for the purposes of larger experience, and its chief contribution to experience is given in memory, association, intelligence and a clearer consciousness. Finally, attention in all its grades is most intimately connected with conscious phases of mind and is, in its highest form, preëminently an effort in the organism together with a sense of effort in consciousness, along with some activity and also some principle of direction not yet disclosed in the organism or in consciousness.

BIOGRAPHY.

(In accordance with University regulations.)

The writer was born February 24th, 1848, near Millersburg, Ohio. His parents' names are Henry Harrison and Catharine Wolgamott Uhl. After his preliminary education he took a course of four years and one term at Wittenberg College where he received the degree of B. A., in 1871; and then three sessions of study in the Wittenberg Theological Seminary. He received ordination at Wooster, O., in 1872. The entire period 1873–1884 inclusive was spent in British India, the first two of these years were devoted more particularly to the study of Telugu, a vernacular language. In 1874 he received the degree of M. A. from Wittenberg College. He had charge of the "Guntur Mission High School" and taught there for eleven years, having also charge of native boys in a dormitory and teaching in the Mission Training School for the same time. In 1885, he published "The Decay of Christianity," and also "Law and Gospel," at Madras. He entered the Johns Hopkins University in the year 1886 and has been in the graduate department for three years, following courses in philosophy and psychology under Dr. G. S. Hall and Dr. H. H. Donaldson, and in sanskrit under Dr. M. Bloomfield, and has received much stimulation and aid from Mr. G. H. Emmott in the study of ethics. He is under many obligations to all his instructors, and here records his hearty appreciation of their services and his esteem for themselves.

LEMON LEANDER UHL.

BALTIMORE, MD.,
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